DOCUMENT RESUME

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ABSTRACT

    THIS PAPER EXPLAINS THE DEVELOPMENT OF AN INFORMATION SEARCH AND RECORDING SYSTEM (ISRS) FOR RESEARCH AND DEVELOPMENT ORGANIZATIONS WHICH REQUIRE AN EFFICIENT METHOD OF LOCATING AND RECORDING STORED INFORMATION, INCLUDING LITERATURE SEARCHES BY STAFF MEMBERS. THE SYSTEM WILL ENABLE STAFF MEMBERS TO: (1) LOCATE STORED INFORMATION BY USE OF A CLASSIFICATION AND ADDRESS SYSTEM SPECIFICALLY DESIGNED FOR PROGRAM NEEDS; (2) DEVELOP A GREATER DEGREE OF COMMUNICATION CONCERNING DEVELOPMENTAL ACTIVITIES BY USE OF A COMMON LANGUAGE BUILT INTO THE SYSTEM; (3) DISCRIMINATE IN CHOICE OF PERSONAL READING AND DATA GATHERING MATERIALS BY OBSERVATION OF TYPES OF MATERIAL READ BY OTHER STAFF MEMBERS AND BY EMPHASIZING EXPERIMENTAL RESEARCH RELATED TO PROGRAM; AND (4) KEEP ABREAST OF CURRENT RESEARCH BY REGULAR PERSONAL READING OF EXPERIMENTAL MATERIALS, INCLUDING ABSTRACTS OF MATERIAL READ BY OTHER STAFF MEMBERS. THE SYSTEM CAN BE PLANNED AND PUT INTO OPERATION BY ONE STAFF MEMBER IN APPROXIMATELY THIRTY HOURS PLUS SECRETARIAL TIME. BEFORE THE SYSTEM IS DEVELOPED, CONTACT IS MADE WITH SUPPLIERS OF INFORMATION RETRIEVAL SYSTEMS TO DETERMINE THE FEASIBILITY OF AN AUTOMATIC RETRIEVAL SYSTEM FOR THE ORGANIZATION. IF AN AUTOMATIC SYSTEM IS NOT WARRANTED BY PRESENT INFORMATION NEEDS, THE PROCEDURES AND CONCEPTUAL FRAMEWORK FOR THE NON-AUTOMATIC SYSTEM CAN BE EASILY ADAPTED TO AN AUTOMATIC SYSTEM IN THE FUTURE. (AUTHOR/JB)
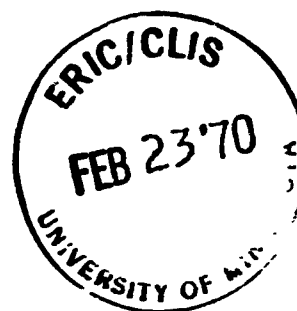
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THE DEVELOPMENT OF AN INFORMATION SEARCH AND RECORDING SYSTEM

for research and development organizations

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October 1969

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(Prepared pursuant to a contract with the U.S. Department of Health, Education, and Welfare, Office of Education)

TABLE OF CONTENTS

ABSTRACT

This paper explains the development of an Information Search and Recording System for research and development organizations which require an efficient method of locating and recording stored information, including literature searches by staff members. The system will enable staff members to:

1. Locate stored information, including results of previous literature searches, by use of a classification and address system specifically designed for program needs.

2. Develop a greater degree of communication concerning developmental activities by use of a common language built into the system.

3. Discriminate in choice of personal reading and data gathering materials by observation of types of material read by other staff members and by emphasizing experimental research related to program.

4. Keep abreast of current research by regular personal reading of experimental materials, including abstracts of material read by other staff members.

The system can be planned and put into operation by one staff member in approximately thirty hours plus secretarial time. Before the system is developed, contact is made with suppliers of information retrieval systems to determine the feasibility of an automatic retrieval system

for the organization. If an automatic system is not warranted by present information needs, the procedures and conceptual framework for the non-automatic system can be easily adapted to an automatic system in the future.

Once the system has been planned and implemented, the research staff is trained in 20-minute sessions in the use of the system. Training in the use of ERIC may be included at this time. Continued input to the system is insured by the usual acquisition process for library materials and by additions to the reading review entry system, an information recording method designed specifically for researcher needs.

RATIONALE

Developmental research in all fields relies upon evidence gathered from numerous sources to support principles and practices which are undergoing development. Those engaged in development activities must therefore have access to an efficient means of examining information related to their projects. This paper outlines briefly some problems associated with information retrieval and suggests a system for searching and recording information which supports developmental research (Ammentorp, 1968).

Problems of information retrieval and developmental research

All systems of information storage and retrieval have some method of assigning an index classification or address to a particular piece of information. Thus, a book may be indexed by means of a library number system; personnel records, by employee's last name; project reports, by date of completion. In each case, the address merely insures that the piece of information will have a unique location; it reveals little or nothing about the content of the material which is stored at that address. Because the usual address systems are too general to meet personal information needs, the researcher must use some other means to determine more specifically what is contained at a particular address. He must find some way of translating the concepts of his project into various address systems, abstracting the needed information and recording it for future retrieval by himself or other members of the research staff (Figure 1).
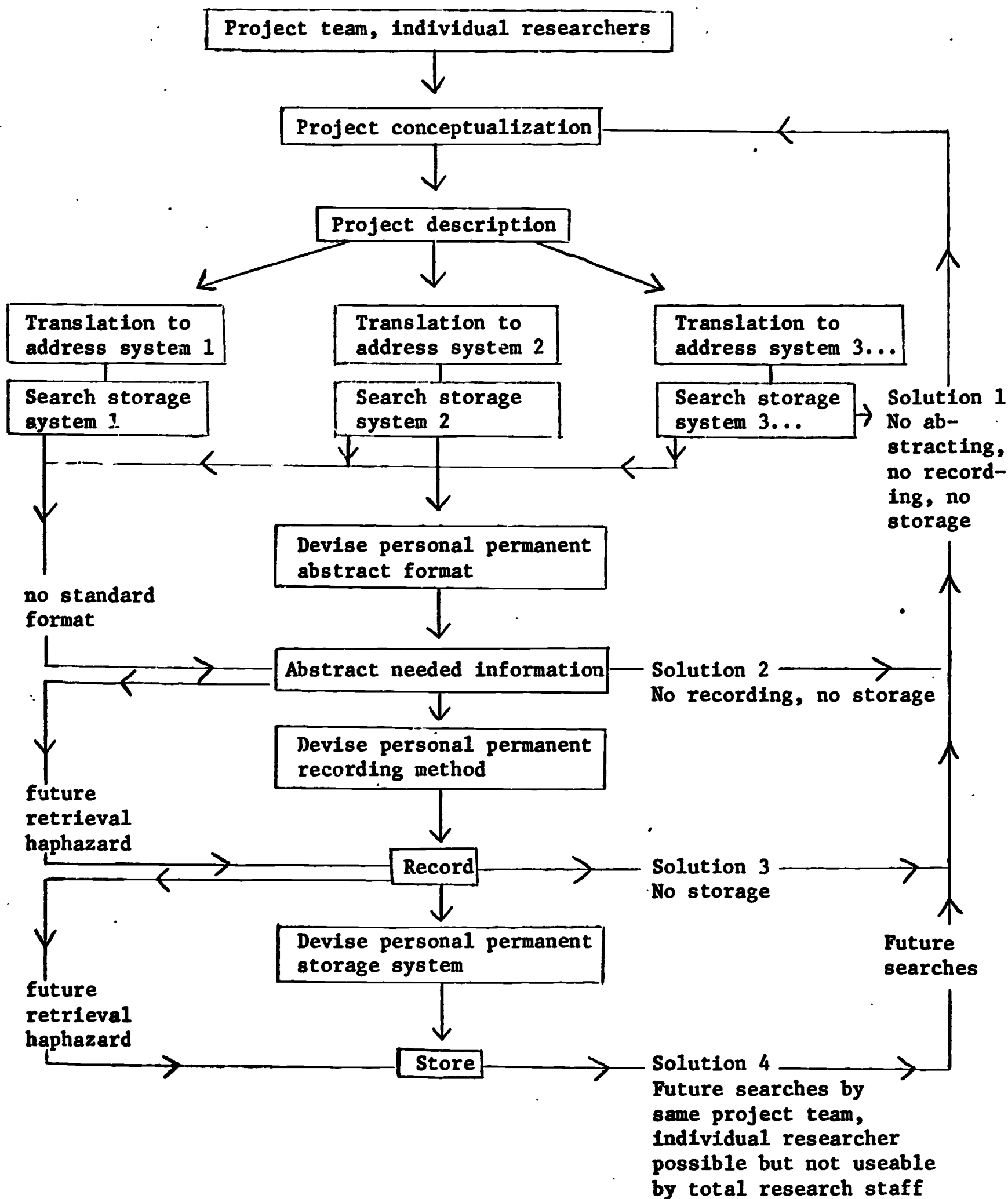
Fig. 1. Researcher information
retrieval needs, personal
solution.

To meet the needs of individual researchers and the entire research
staff, it is therefore feasible for an organization to develop an
information retrieval system tailored to its program. The information
retrieval system designed for researchers' use will have as addresses
those concepts with which they describe their development problem
and some provision for recording searched information which will enable
them to return quickly to that particular piece of information (Figure 2).

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        │  Project conceptualization   │◄─────────────────┐
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        │  Information Search and Recording System   │  Future searches
        │              Term Framework                │     │
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        │   Search information storage   │                 │
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            │   Information storage     │───────────►───────┘
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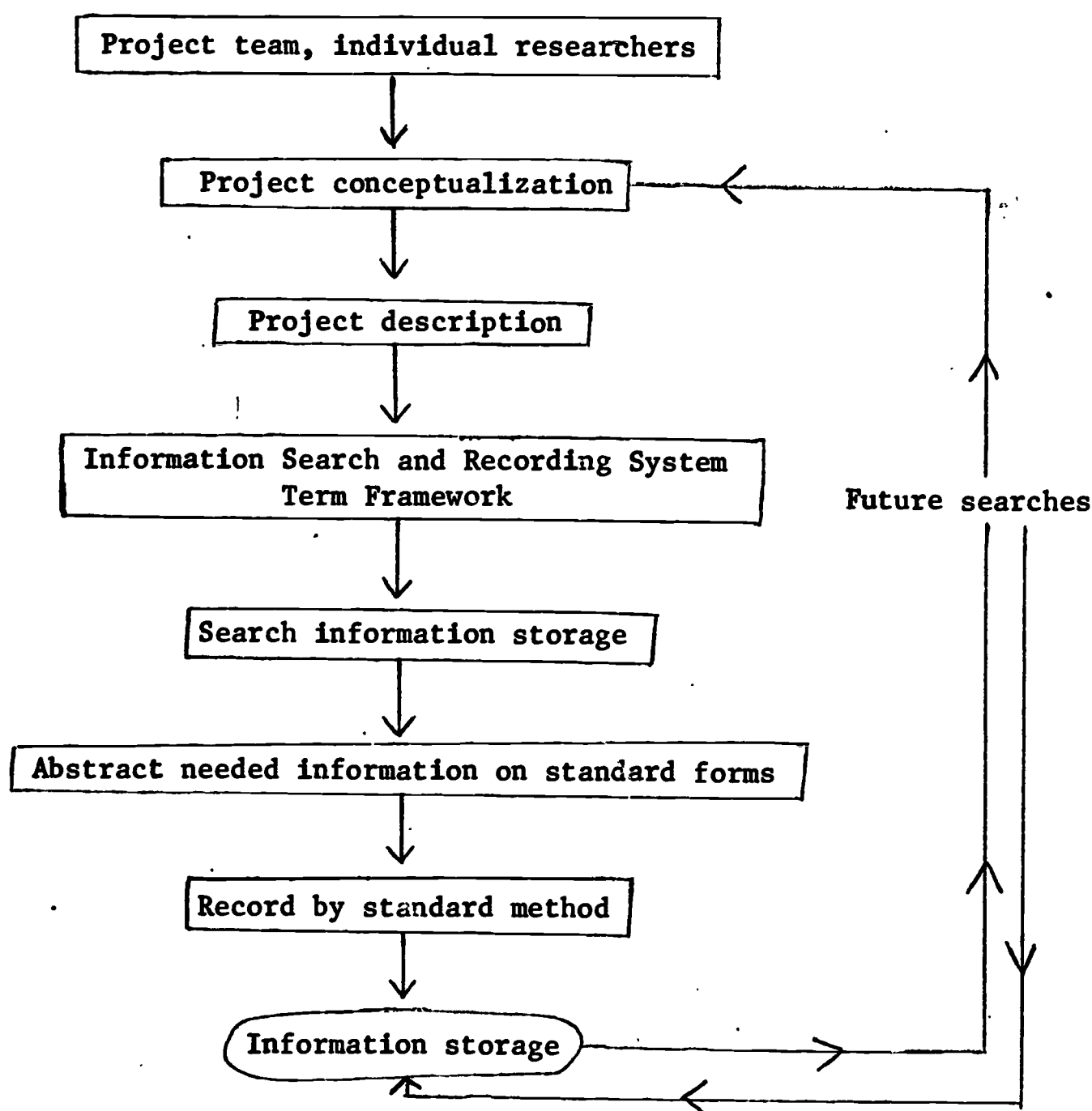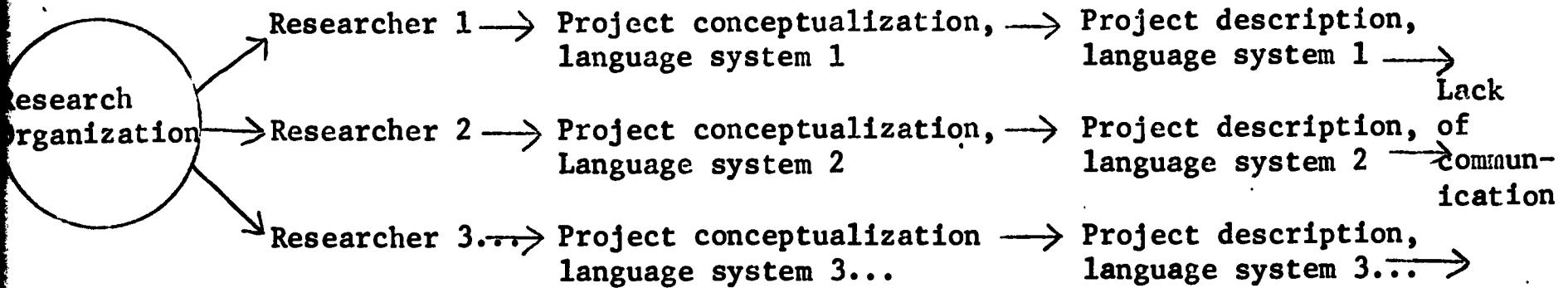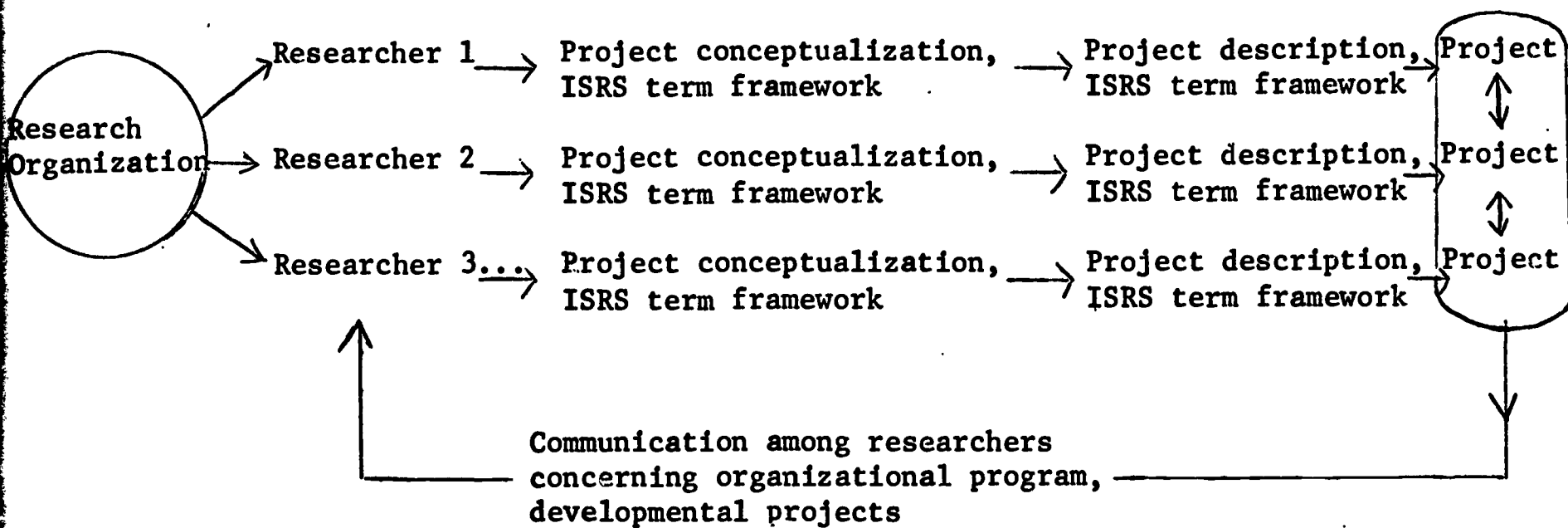
Fig. 2. Researcher information
        retrieval needs, system solution.

The need for information recall is an important dimension of the efficiency problem in developmental research, Often extensive literature searches are made on a particular problem with only the end result in sight. Information gathered in searches of this type tends not to be retained in a form by which it can be efficiently recalled. At the same time, searches including particular addresses (e.g., a journal article) are not recorded which results in repetitive information forays from one project to the next.

Another problem of information retrieval within a particular organization is that all members of a research team may not use the same concepts and vocabularies to describe the various activities of the developmental program. This is especially true in the field of education which involves many language systems, depending on the particular theories that are subscribed to by individual organizations. A greater degree of communication regarding program activities is a crucial but often overlooked need of the research staff whose members use various terminologies to describe their projects (Figure 3). Therefore, an information retrieval system which ameliorates the intra-communication problems of a research staff will have a common language built into the address system. In order to locate material in the storage system, a researcher must use the terminology of the system. His translation of the concepts of his project into the system's common language is then reinforced by his being able to locate the needed information.

Research Organization →
- Researcher 1 → Project conceptualization, language system 1 → Project description, language system 1 →
- Researcher 2 → Project conceptualization, Language system 2 → Project description, language system 2 →
- Researcher 3... → Project conceptualization language system 3... → Project description, language system 3... →

Lack of Communication

Research organization without system

Research Organization →
- Researcher 1 → Project conceptualization, ISRS term framework → Project description, ISRS term framework → Project
- Researcher 2 → Project conceptualization, ISRS term framework → Project description, ISRS term framework → Project
- Researcher 3... → Project conceptualization, ISRS term framework → Project description, ISRS term framework → Project

Communication among researchers concerning organizational program, developmental projects

Research organization with system

Fig. 3. Comparison of communication
concerning developmental program in
research organizations with and without
Information Search and Recording System.

The Information Search and Recording System (ISRS) outlined in the following

pages represents an attempt to meet these information retrieval problems

within the scope of financial means and human resources available to

low-expenditure research and development operations. In its design
the authors have kept in mind the possibility that automated data
handling techniques may become available and have used an information
subject classification scheme and procedures compatible with such
equipment.

DEVELOPMENT

Deriving system objectives

Before designing an Information Search and Recording System especially
tailored to its needs, the research organization analyzes its information
retrieval problem. Users are identified, individual user and
organizational needs are determined, and quantity of stored informa-
tion, rate of info. ... on increase, and development constraints are
investigated. It is then possible to substantiate the need for an
Information Search and Recording System and to set objectives of the
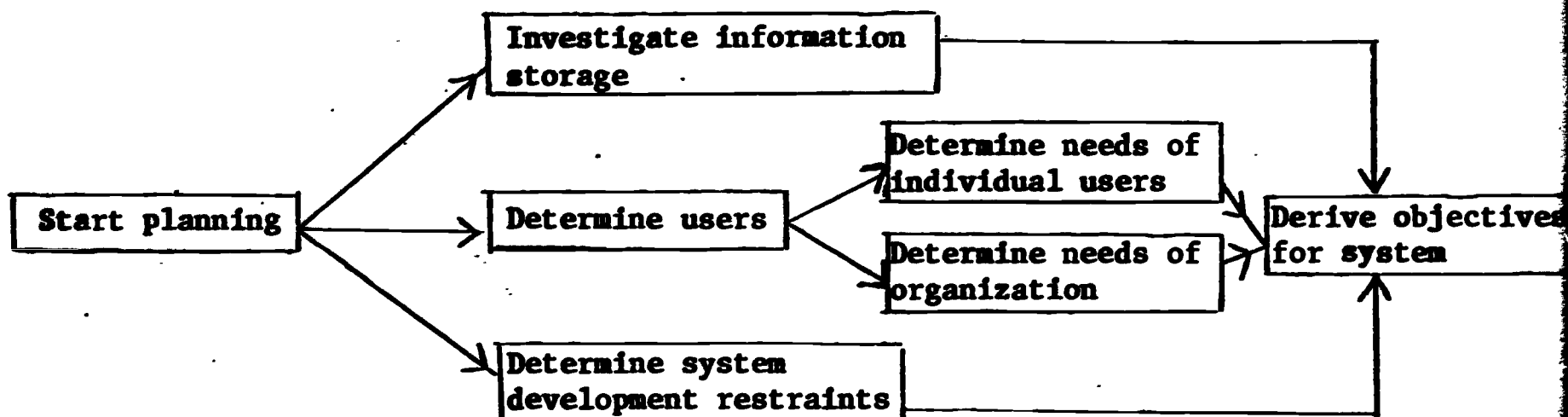system in terms of behavioral outcomes of the research staff
(Figure 4).

Fig. 4. Deriving objectives for
an Information Search and Recording
System.

An example of system objectives stated in terms of behavioral outcomes of the research staff is shown below. These are the objectives for the particular system outlined in this paper; research organizations tailoring the system to their specific information needs may well derive different objectives.

Objectives for the Information Search and Recording System (ISRS)

Once ISRS has been implemented, the research team will be able to:

1. Locate stored information, including results of previous literature searches, by use of a classification and address system specifically designed for program needs.

2. Develop a greater degree of communication concerning developmental activities by use of a common language built into the system.

3. Discriminate in choice of personal reading and data gathering materials by observation of types of material read by other staff members and by emphasizing experimental research related to program.

4. Keep abreast of current research by regular personal reading of experimental materials, including abstracts of material read by other staff members.

Before system development begins, the research organization should consider use of automatic retrieval equipment to assist in achieving system objectives. Contact is made with commercial suppliers of information retrieval systems to determine the feasibility of an automatic system for the organization. If it is not warranted by

present information retrieval needs, system development proceeds without the use of automatic devices, but contact should be maintained with such suppliers if it is likely that information retrieval needs will increase. In any case, the procedures and conceptual framework developed for the non-automatic system can be adapted to an automatic system.

The system

The ISRS design explained in this paper has been developed especially to meet the problems of information retrieval in developmental research, as outlined in the Rationale, and specifically to achieve the behavioral outcomes stated above. It consists of two components:

1. An address system "targeted" to the specific needs of the research staff. The address system is a subject classification scheme generated from the focus and direction of the developmental program.

2. An information storage system readily available to the research staff which supports all phases of developmental activity, organizational management and dissemination of research. The information is obtained by the usual acquisition processes of special libraries and a unique reading review entry system.

Both components are explained in detail on the following pages (Figure 5).

Research Program

Developmental   Organizational   Dissemination
activities   management   of research

Information Search and Recording System

Reports

Papers

Journals

Pamphlets

Books

Information
storage

ERIC
microfiche

Dissemination
procedures

other
non-print
media   Reading
         review
         entries

Management
information

Subject
classification
scheme –

Term Framework

- generated
  from
  program
  direction
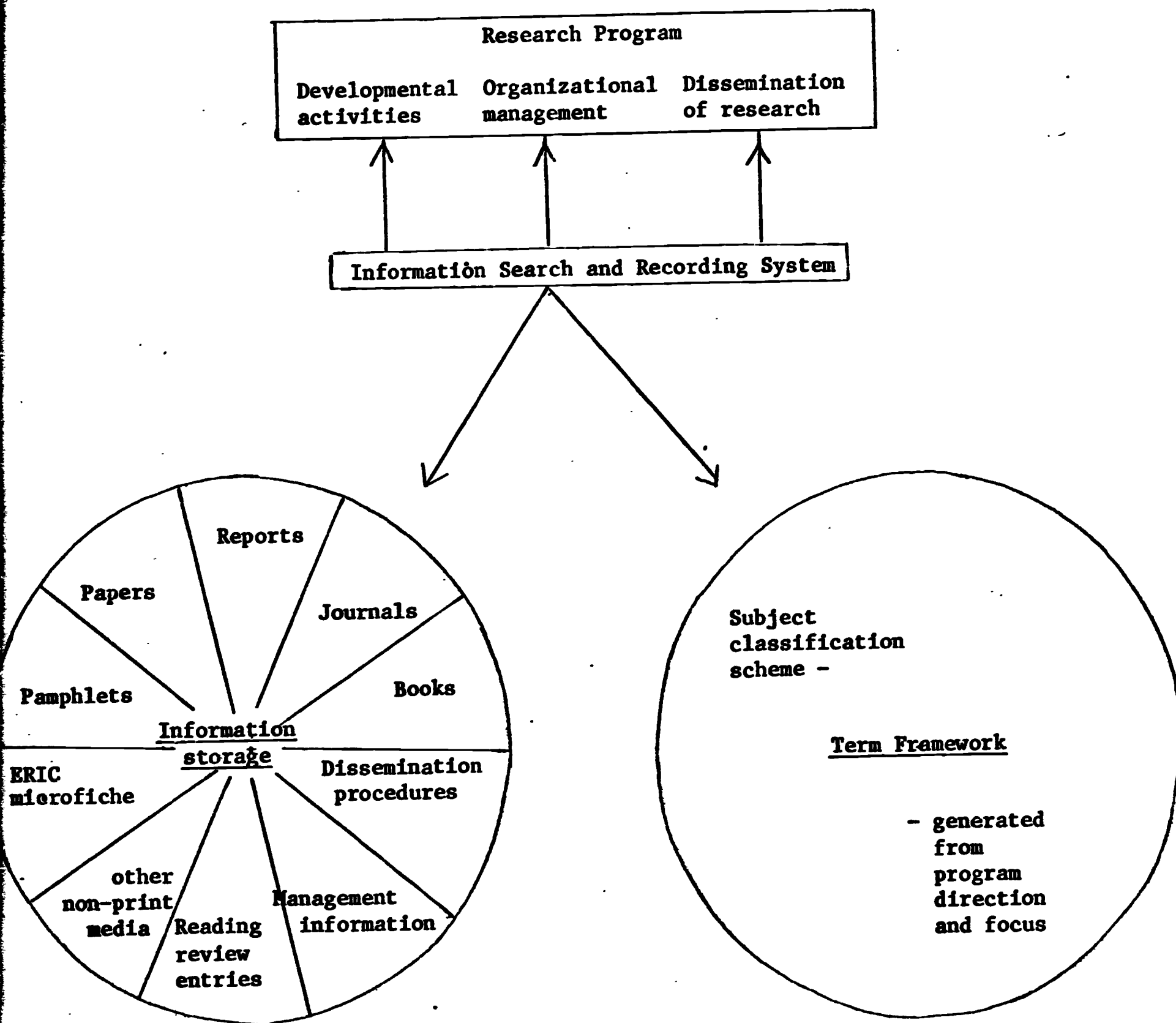 and focus

Fig. 5. The Information Search and
        Recording System supports all aspects
        of the research program.

The term framework

The address system tailored to meet the information needs of the research

staff is a framework of precise terms logically arranged which describes

the specific research activity of the organization. (The word "term"

will be used in this paper to mean a single word or a phrase.) This is

the common language built into the system which develops greater

communication among staff members concerning the developmental program.

The logical arrangement of terms involves several levels of generality.

The top level terms, called <u>categories</u>, are intended to store the

addresses of information relating to the same general topics. Categories

allow for development within the organizational program over a period

of time but are specific enough that a change in the main direction of

the program will necessitate different categories.

A workable number of categories ranges from five, for a developmental

program of very narrow scope, to twenty, for programs of a broad scope.

For instance, the number of categories needed to store information

needed by a research staff in behavioral engineering is twelve at

present:

behavior	programmed instruction
curriculum	reinforcement
management	research methodology
objectives	simulation
organizational systems	stimuli
populations	technology

Some categories are broader in scope and might logically include categories

of a narrower scope. However, both terms are established as categories

because of the quantity of information in those categories and the need

for quick retrieval of specific information. For example, the category

behavior is broader than stimuli, and stimuli might logically be placed as a more specific term under behavior. However, the need for speed in retrieval of information on many aspects of stimuli requires that it be established as a category by itself. Material stored under behavior contains general information, while that stored under stimuli pertains to that specific aspect of behavior (Figure 6).

Proceed to listing lower level terms

Developmental program

List possible categories

Are all categories of the same scope?

Yes

No

Is the category too broad, considering quantity of information to be addressed and/or logic of framework?

Yes

No

Break down into more specific categories.

Is the category too narrow, considering quantity of information to be addressed and/or logic of framework?

Yes

No

Delete and file information on this topic in more general category.

Will categories provide basis for efficient retrieval?

Yes

No

Add or delete categories to provide basis for efficient retrieval.
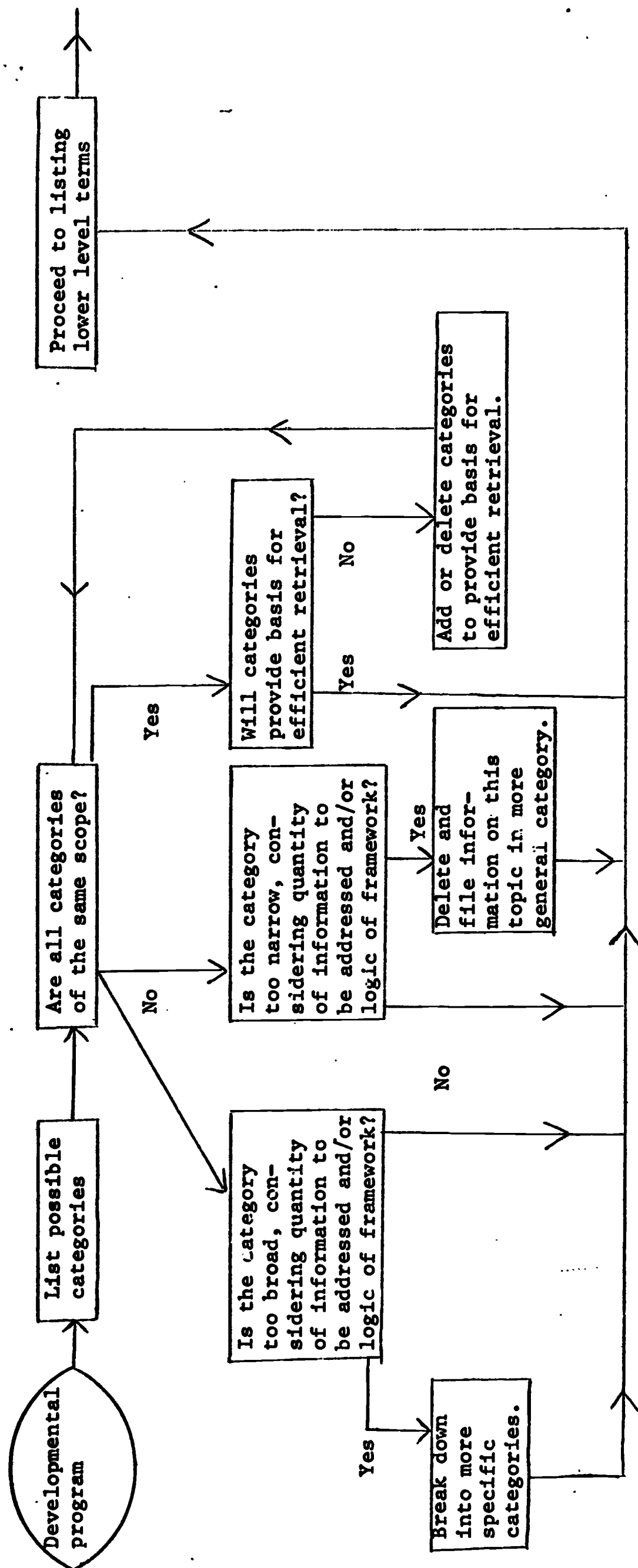
Fig. 6. Establishing the categories.

Within each category the researcher directs his attention to lower level terms of a more specific nature which are arranged within the category by levels of generality. These terms are expected to change a s the program develops, and the process for changing them must therefore be efficient. It will be explained under Changing the term framework.

A workable number of levels below the category terms is from none, for categories which are sufficiently specific at present, to three, which will probably provide sufficient degrees of specificity for retrieval purposes if the categories have been well-chosen (Figure 7).

Category	Level 1	Level 2	Level 3
programmed instruction			
behavior	attitudes and values classes of measurement of		
curriculum	bank content	unipac construction English foreign languages mathematics reading science	
objectives	measurement of	testing	teacher-made standardized

Fig. 7. Examples using no, one, two, and three lower term levels.

Following the usual format of the term framework, these examples would

be listed in this way:

programmed instruction

behavior

attitudes and values
classes of   } This is one level with three
measurement of   terms in it.

curriculum
bank
unipac construction
content
English
foreign languages
mathematics   } This is one level with five
reading   terms in it.
science

objectives
measurement of
testing
teacher-made
standardized

If three levels do not provide sufficient degrees of specificity, a

category narrower in scope should be established to avoid an awkward
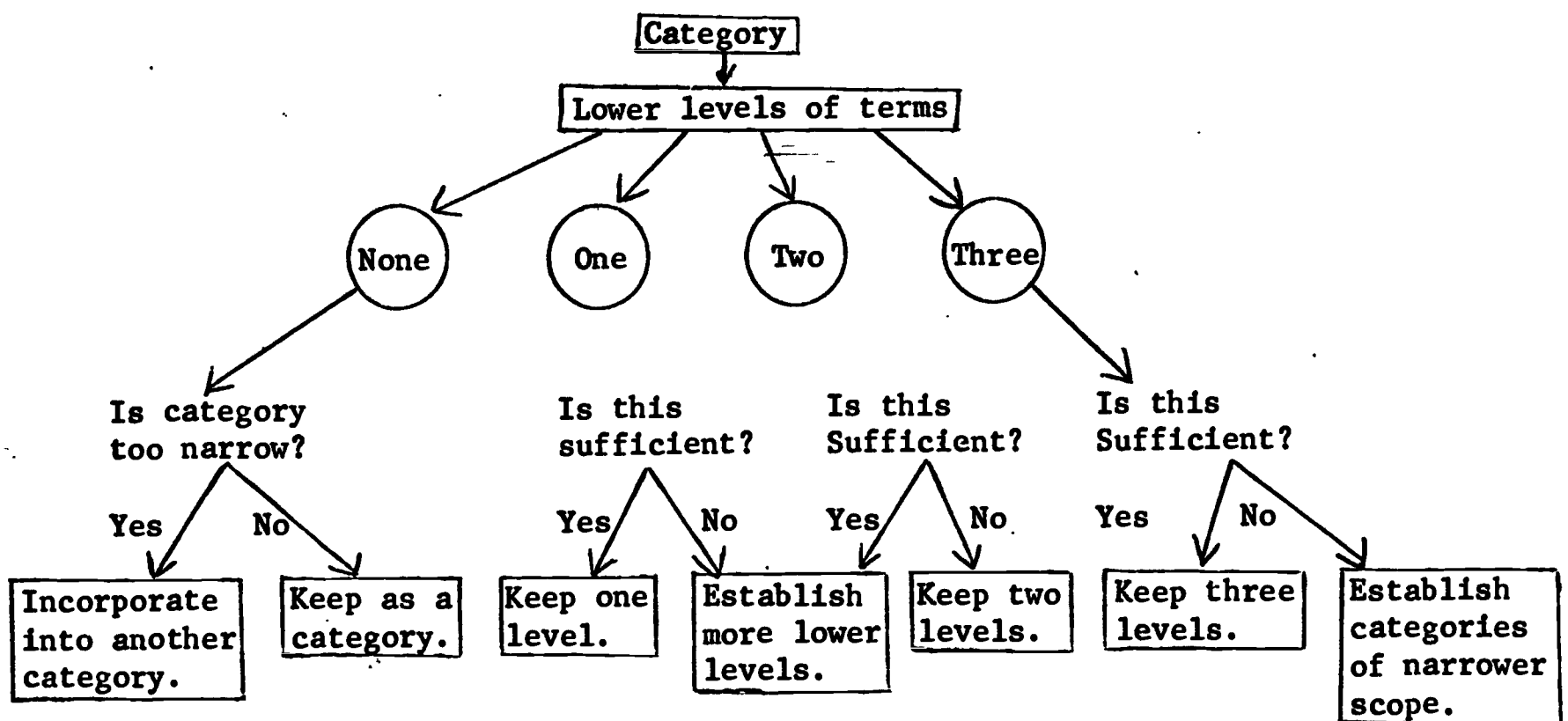
term framework.

Fig. 8. Establishing the lower term
levels.

The term framework enables each researcher to conceptualize and describe
his project with the common language system so that he can then use
the address system designed for the information needs of the entire
research staff. The results of his literature searches are recorded
and added to the information storage for future use by himself or
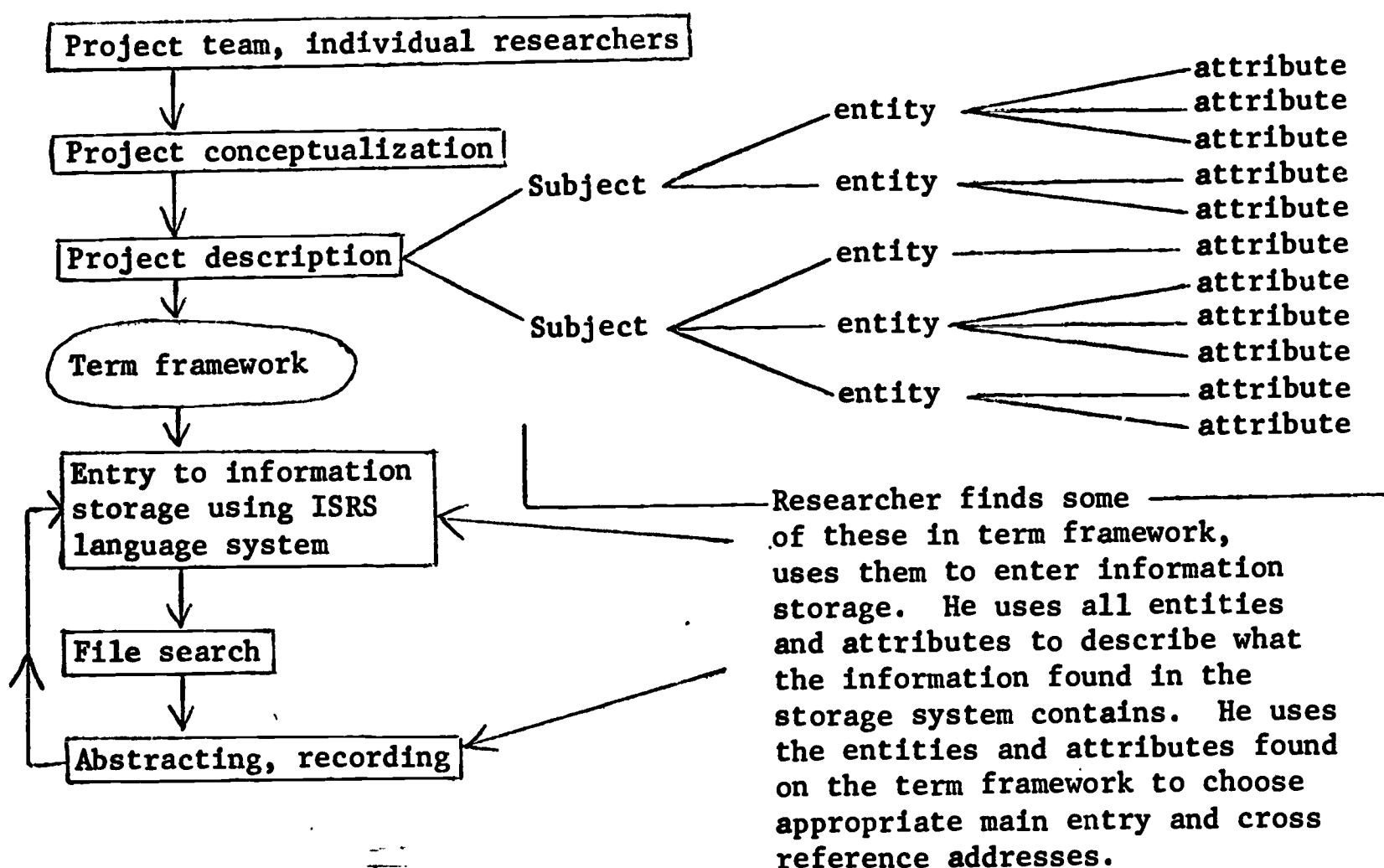other members of the project team (Figure 9).

Fig. 9. Researcher use of Information
Search and Recording System to enter
information storage, describe found
information on reading review entries,
and indicate addresses for recorded
information.

Changing the term framework

When a change in the lower level terms is necessary due to minor changes in developmental activity, refiling within the category is required. If a lower level term is dropped, all addresses filed under that term are refiled under the term one immediate level above. An example would be the deletion of the term PERT located under the higher level term, systems analysis. All addressed information stored under PERT would be refiled under systems analysis. Another example would be the addition of the more specific term dialect under English. The addresses to material on "dialect" filed in English would be refiled at a lower level under dialect (Figure 10). Refiling reading review entries requires additional procedures due to cross reference method (Appendix 6).

```
                        ┌──────────┐
                        │ Category │
                        └────┬─────┘
                             │
                             ▼
                     ┌──────────────────┐
                     │ Lower level term │
                     └──────────────────┘
```

Deletion	Addition
Refile all addresses under term one immediate level above.	Pull addresses to material on new lower level term from term which will be one immediate level above new term.
Example:	Example:

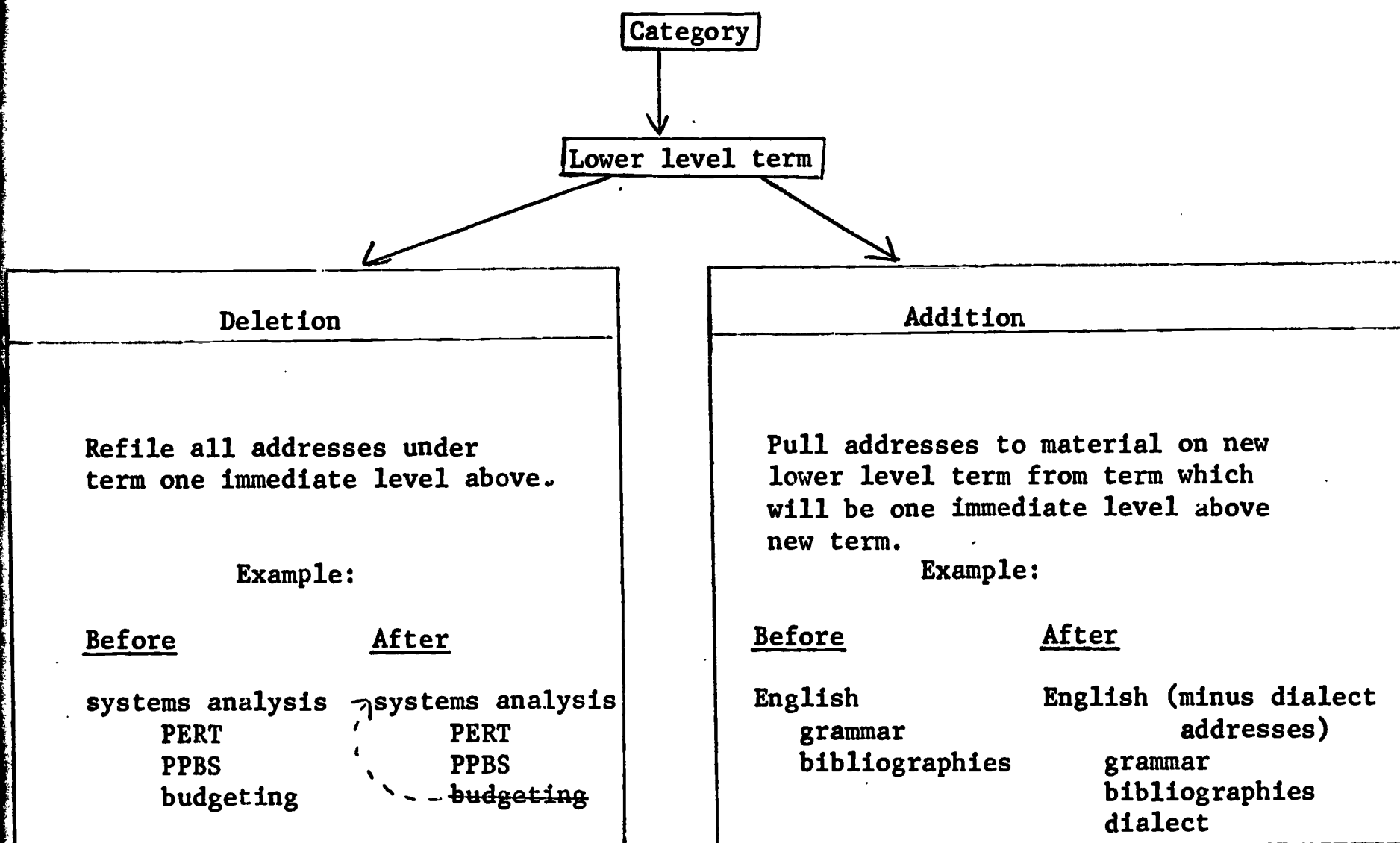| Before	After	Before	After
systems analysis	systems analysis	English	English (minus dialect addresses)
PERT	PERT	grammar	grammar
PPBS	PPBS	bibliographies	bibliographies
budgeting	~~budgeting~~		dialect

Fig. 10. Changing the term framework.
Addition and deletion of lower level terms.

Coding the term framework

An efficient method of indicating the address of a particular piece
of information is to give each term within the framework a unique
number. The coding procedure is an especially important consideration
if the use of an automatic information retrieval system is likely. It
is also a necessary shorthand method with which to indicate cross
reference terms, as will be seen below. A workable coding system is
to assign each category a one-or two-digit numeral followed by a
decimal point. Each level of terms below the category is assigned
two digits to the right of the decimal point. Thus, a term on the
lowest possible level would have one or two digits to the left of
the decimal point and six digits to the right. For example, the code
numbers of the following category and lower level terms would be:

```
4. 0 0 0 0 0 0       objectives
4. 0 1 0 0 0 0           measurement of
4. 0 1 0 1 0 0               grading
4. 0 1 0 2 0 0               testing
4. 0 1 0 2 0 1                   teacher-made
4. 0 1 0 2 0 2                   standardized
```

When listing a series of code numbers, it may be efficient to use only
the non-zero digits to the right of the decimal (e.g., 4.01, 4. 0102),
although when writing the category number, it is helpful to add two
zeroes to the right of the decimal to clearly delineate that this
term is a category and not a lower level term (e.g., 4.00, 8.00).

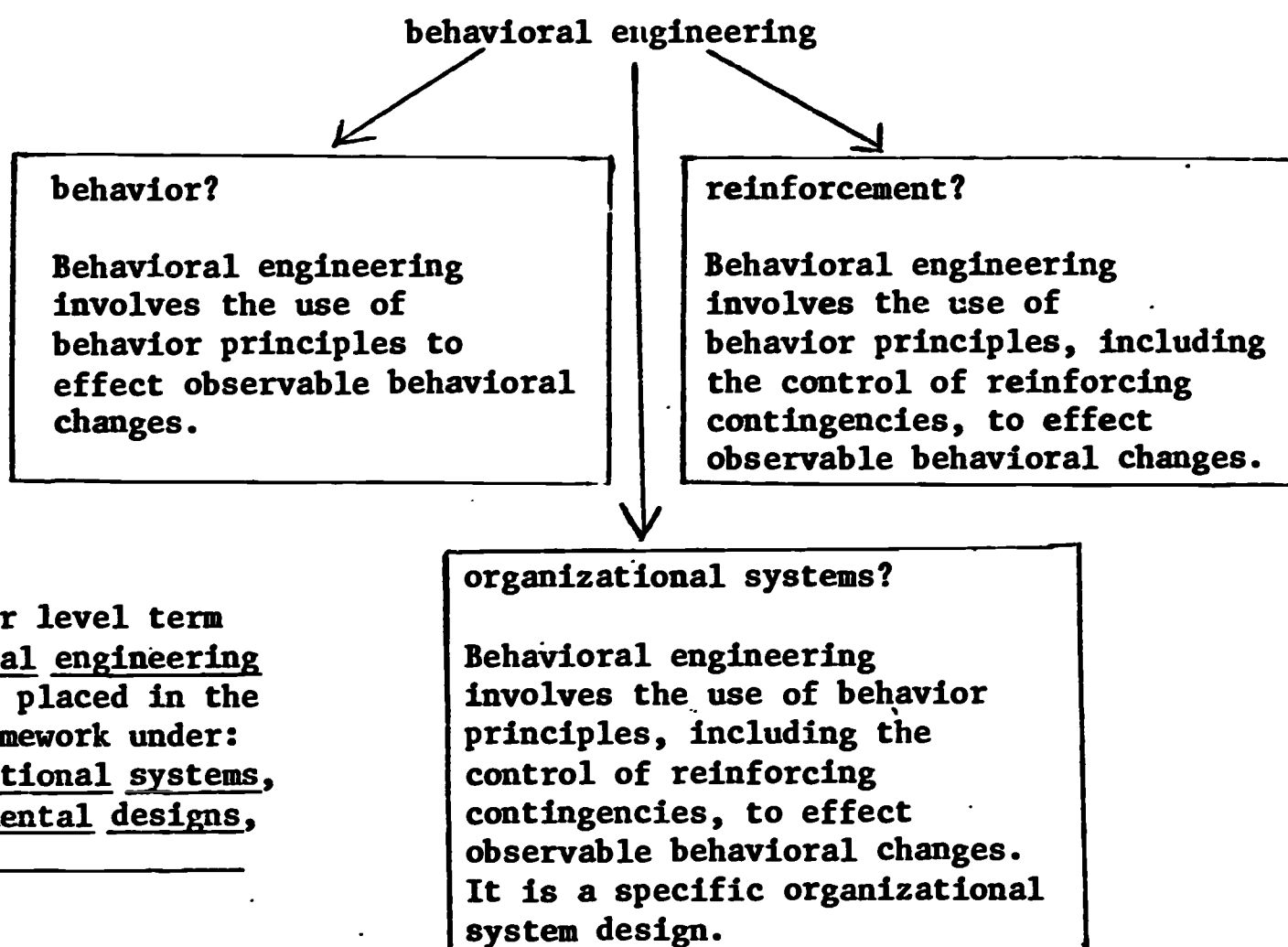## Logic of term framework and cross reference terms

The term framework is available to staff members in a form that allows
them to see at a glance the possible addresses under which they may
address or locate material. Some terms will relate to more than one

category in the framework, but if the logical base of the framework
is clear to the system indexer, there will be one category under which that
term fits best. For instance, the term behavioral engineering could
be placed under the category reinforcement, lower level term conditioning
but since behavioral engineering refers more specifically to an environ-
mental design using the principles of behavior, it is more properly
filed under the category organizational systems, lower level term
environmental designs. (The lowest level term in any sequence will be
double underlined to show that this is the term level at which an
address is stored) (Figure 11).

Category   Category   Category

?   2   ?
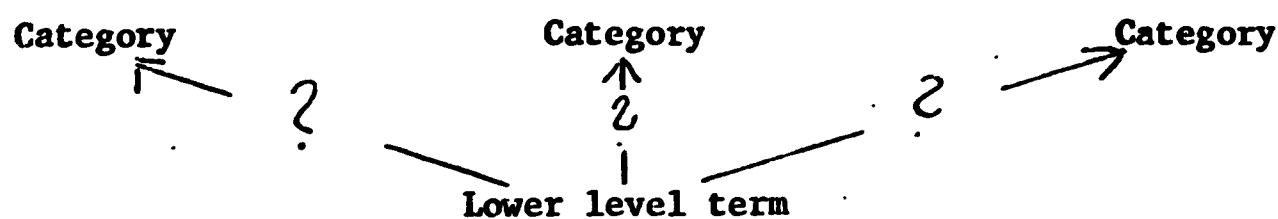
Lower level term

Which category most precisely describes the lower level term?

Example:

behavioral engineering

behavior?

Behavioral engineering
involves the use of
behavior principles to
effect observable behavioral
changes.

reinforcement?

Behavioral engineering
involves the use of
behavior principles, including
the control of reinforcing
contingencies, to effect
observable behavioral changes.

The lower level term
<u>behavioral engineering</u>
would be placed in the
term framework under:
<u>organizational systems,
environmental designs,</u>

organizational systems?

Behavioral engineering
involves the use of behavior
principles, including the
control of reinforcing
contingencies, to effect
observable behavioral changes.
It is a specific organizational
system design.

Fig. 11. Determining the location of lower
level terms.

The same "term" (word or phrase) may be used more than once in the frame-

work but only if it refers to different aspects of that term in each

location. An example would be the term <u>measurement,</u> or <u>measurement of.</u>

This term is found under the categories behavior, objectives, and research methodology. In the first instance, "measurement of" refers only to the coding and recording of behavior. In the second, it means the measurement of achievement of objectives, e.g., grading and teacher-testing. In the third, "measurement" refers to measurement strategies used in research, e.g., multiple linear regression, correlation, statistical inference.

In spite of these provisions for a logical and precise arrangement of the term framework, there will no doubt be terms which should be followed by some indication of other terms in the framework which address related information. Cross referencing is easily accomplished by listing after the term the code numbers of all addresses containing closely related information. For instance, information on Afro-Americans is addressed under populations, disadvantaged, Afro-American. However, related information is addressed under curriculum, content, English, Afro-American dialect; the code number of the lowest level term Afro-American dialect should be listed as a cross reference for populations, disadvantaged, Afro-American. In this way the researcher may enter the system through one term and be referred to others that would not have occurred to him without the aid of cross references. It is helpful to separate the code numbers from the term by an asterisk (e.g., curriculum* 4.00, 7.0203).

This method of cross referencing should be reserved for those terms that very often address related information. To provide complete addressing of each piece of information, another cross reference method is used

in which separate cross reference entries are filed under the appropriate terms. This procedure is explained below under Entry formats.

Thesaurus

If the problem of usage of various vocabularies by staff members is too complex to be solved by the establishment of a term framework alone, a term index or thesaurus may be developed which will guide system users to the proper terminology for their concepts. The ERIC Thesaurus may be easily adapted for this purpose. The system indexer lists after each ERIC descriptor the code number of the category by which the researcher should locate his information. If it is feasible in terms of time and effort, lower level term code numbers may also be listed. However, this involves great time expenditure and should be carefully considered for its long range usefulness. Once system users become familiar with the term framework and are comfortable using its controlled vocabulary, the thesaurus will be useless for entering ISRS storage except for newcomers to the research staff.

ISRS and other storage systems

The system explained in this paper is an attempt to answer the needs of research organizations which need an efficient method of·information retrieval tailored to their developmental programs, information storages, and organizational objectives. No national information network can fulfill these functions; the Educational Resources Information Center (ERIC) provides excellent support for ISRS when integrated into the system as a component of the information storage. However, ERIC attempts to answer the needs of all people in the field of education and therefore

cannot provide a common language system of precise terms targeted to the research staff of a particular organization. Even educational information networks of a more limited scope (e.g., Science Information Exchange [behavioral sciences], ERIC Clearinghouse for Educational Media and Technology) do not meet all the needs of developmental research since they cannot provide the common language system concerning program activities nor a recording method by which the researchers themselves regularly add results of personal literature searches to the information storage. Certainly the more global information networks should be integrated into ISRS in a manner which enables researchers to draw from them the information which will later be abstracted, recorded and addressed in ISRS. However, the large networks cannot substitute for the specially tailored system.

Filing of addresses within each term section

Entries within each term section (i.e., all information stored under research methodology, contingency management, etc.) are filed alphabetically by author's last name. For example, under contingency management, an article by Homme comes before one by Tosti.

The system indexer

The individual (or individuals) who indexes stored information must be a specialist in the subject matter area of the organization. He must understand the focus and direction of the developmental program, for it is from these that the term framework is generated. He must have these knowledges and skills:

1. Know what all the terms mean and how they relate to each other in order to place them in a logical arrangement according to quantity of information stored and specificity required.

2. Be able to scan material rather than look only at title and table of contents to determine main entry and cross reference addresses.

3. Have read enough of the literature in the field to address material correctly.

4. Be able to consistently translate the various language systems used in research materials into the precise terminology required by the organization.

It is helpful for the indexer to list those words and phrases which he must often translate into the system's precise language; this insures consistency in filing information on the same subjects. For instance, the framework may use the terms curriculum, development. Often the words "curriculum improvement" and "curriculum change" are used to describe the same concept as "curriculum development." Therefore, the system indexer lists "curriculum improvement" and "curriculum change" after curriculum, development on the term framework. This framework supplemented by commonly used terms should not be available to staff members who are to use the common language to address and locate material. It simply insures consistency of addressing by the system indexer who classifies the large quantities of information acquired by the organization.

Occasionally the indexer may feel it is necessary to indicate inter-
changeable terms in the framework available to the research staff.
For example, the terms <u>Afro-American</u>, <u>Negro</u>, and <u>black</u> are so commonly
interchanged that this may be indicated on the term framework used
by the research staff. Any loss of precision in vocabulary is
compensated for by the added useability of the framework. It is helpful
to separate the interchangeable terms by a slash (e.g., <u>black/Afro-</u>
<u>American/Negro</u>). Such interchanges should be carefully considered
before indicating them on the framework, since they do result in less
vocabulary control.

Entry formats

The Information Search and Recording System may store a variety of
materials (e.g., books, journals, papers, reports, brochures, ERIC
microfiche and other non-print media, reading review entries, manage-
ment information, research dissemination procedures) and each type is
addressed according to a specific format. The format must be consistently
and carefully followed so that accurate bibliographic information is
available to researchers. All materials to be indexed are perused by
the system indexer who determines main entry and cross reference filing
locations within the term framework. The addresses to these materials
(excluding the ERIC microfiche) are typed on cards and filed under the
proper terms. Within each category and lower level term section, cards
are filed alphabetically (Figure 12).

```
┌─────────────────────┐
│ Information input   │
└─────────────────────┘
          ↓
     ╭──────────────╮
    ( System Indexer )
     ╰──────────────╯
          ↓
     ┌──────────────┐
     │ Scan material │
     └──────────────┘
          ↓
     ╭──────────────╮
    ( Term framework )
     ╰──────────────╯
          ↓
┌───────────────────────────────┐
│Choose main entry, cross reference │
│addresses.                     │
└───────────────────────────────┘
          ↓
     ┌──────────────┐
     │ Cataloging   │
     └──────────────┘
          ↓
     ┌──────────────┐
     │ Processing   │
     └──────────────┘
          ↓
```

Information
storage

ISRS

Addresses to infor-
mation storage.
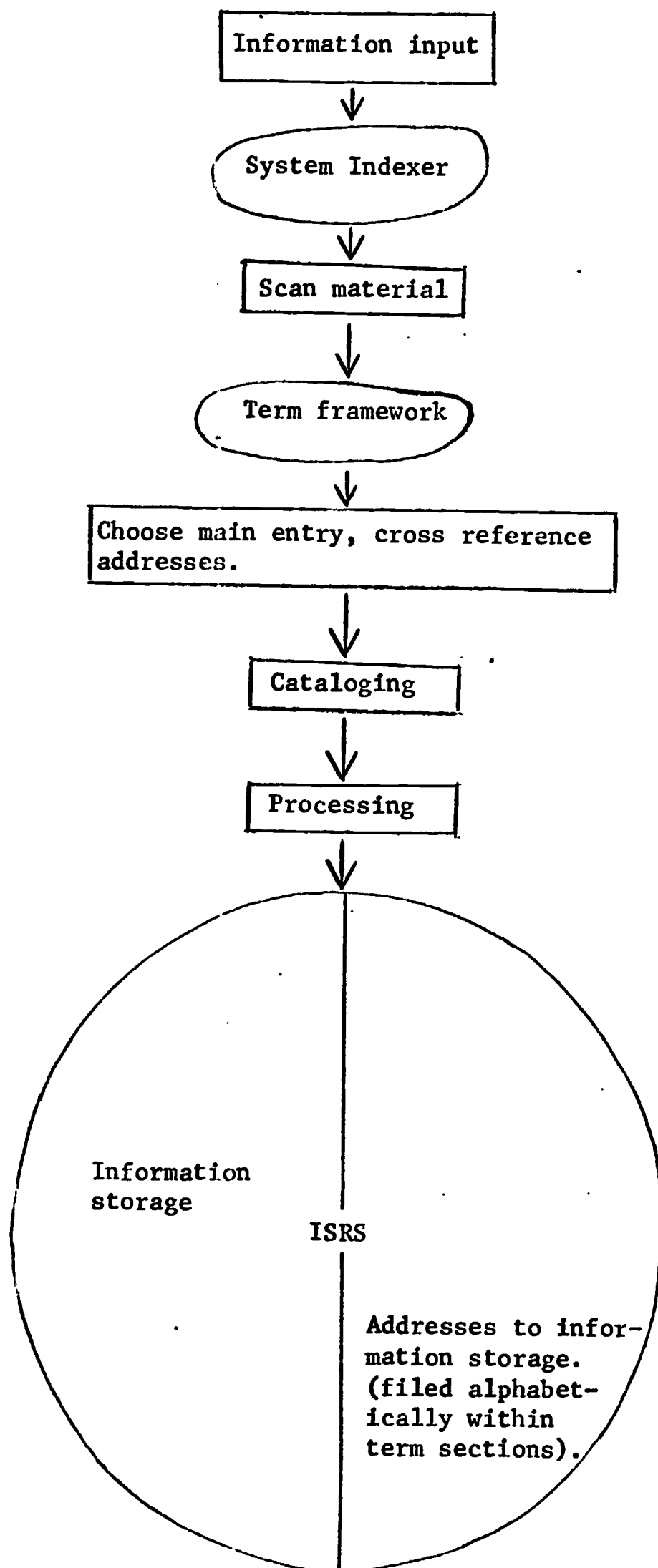(filed alphabet-
ically within
term sections).

Fig. 12. Functions of the system indexer.

Cross reference cards

Cross reference cards for all materials except reading review entries simply repeat the bibliographic information of the main entry (ME) and indicate both main and cross reference (CR) term locations. The address under which a particular card is filed is indicated by the underlining. (Figure 13). Standard 3 x 5 in. index cards are appropriate for main entry and cross reference address cards with two exceptions:

1. Reading review entry cards should be larger than 3 x 5 in., either 4 x 6 in. or 5 x 8 in. depending on information recording needs. These are filed in a separate card catalog to enable researchers to locate them quickly without having to search the address cards for all stored information indexed under a particular term.

2. If an automatic retrieval mechanism is to be available, the cards prepared especially for that system should be used.

Sk

Skinner, B. F.   Science and human behavior.
   New York: Free Press, 1953.

ME: behavior, theories of
CR: reinforcement
CR: organizational systems, environmental
        designs, behavioral engineering
CR: stimuli

(A)

Sk

Skinner, B.F.   Science and human behavior.
   New York: Free Press, 1953.

ME: behavior, theories of
CR: reinforcement
CR: organizational systems, environmental
        designs, behavioral engineering
CR: stimuli

(B)

Fig. 13. Card catalog entry. Main entry (A)
   and cross reference to be filed under
   reinforcement (B). Main entry and cross
   references may be xeroxed from one entry
   and cut and pasted on to 3x5 inch cards.
   ME and CR are underlined after typing,
   xeroxing and pasting.

Reading review entries

The address system explained in the preceding pages is used to index
all pieces of stored information which support developmental activity,
organizational management and dissemination of research. Included
within the information storage are the reading review entries, which
comprise the most detailed recording method available in the
Information Search and Recording System. While every piece of stored
information is addressed by the subject matter topics it pertains to,
the reading review entries provide much additional information of use
to researchers. This is the method by which they can abstract and
record needed information in order to locate it quickly at a future
date. It also provides a record of professional reading and literature
searches carried on by other staff members. By regularly reading the
reading review entries, researchers keep abreast of current research
material being read by others and are guided in the choice of their
own reading material by observation of what others are reading.

The actual material addressed in the reading review entries may be
located in a place other than the organization's storage system. Staff
members may review and abstract material from personal, public and
college libraries. The location of the actual piece of material
recorded is indicated on each reading review entry.

Since these entries include abstracts, researchers are able to tell
generally what the material contains, and in this way the holdings of
the organization's information storage system are supplemented at a
very low cost. On the basis of figures obtained from the University

of Minnesota libraries, it costs approximately $6.84 per volume to purchase, catalog, and prepare for the shelf materials received. This cost is exclusive of the purchase price. Of the total processing estimate of $6.84, $2.48 represents the cost of purchasing, and $4.36 represents the cost of cataloging and shelf preparation. Compare this with the average cost of producing one entry for the Information Search and Recording System, shown below. (Remember, too, that reading review entries also provide abstracts of the material, which the regular library card catalog does not.)

Operations per entry	Average time (min.)	Average salary ($)	Cost per entry
Professional staff time, recording reference and abstract on form.	7	$9.00 hr.	1.05
Receptionist's time, typing card from form.	5	2.17 hr.	.10
Administrative assistant's time, scanning for errors, checking filing locations, numbering.	2	3.22 hr.	.10
Clerk typist's time, xeroxing cards on lists for each staff member.	This figure will not be added in because the procedure has no counterpart at other libraries.		
	(1)	(2.36 hr.)	(.04)
Receptionist's time, typing cross-reference cards and author cards. (Average 2 C.R., 2 authors).	2	2.17 hr.	.04
Receptionist's time, filing cards for main location and cross-reference and author cards.	2	2.17 hr.	.04 $1.33

of Minnesota libraries, it costs approximately $6.84 per volume to purchase, catalog, and prepare for the shelf materials received. This cost is exclusive of the purchase price. Of the total processing estimate of $6.84, $2.48 represents the cost of purchasing, and $4.36 represents the cost of cataloging and shelf preparation. Compare this with the average cost of producing one entry for the Information Search and Recording System, shown below. (Remember, too, that reading review entries also provide abstracts of the material, which the regular library card catalog does not.)

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Administrative assistant's time, scanning for errors, checking filing locations, numbering.	2	3.22 hr.	.10
Clerk typist's time, xeroxing cards on lists for each staff member.	This figure will not be added in because the procedure has no counterpart at other libraries. (1)	(2.36 hr.)	(.04)
Receptionist's time, typing cross-reference cards and author cards. (Average 2 C.R., 2 authors).	2	2.17 hr.	.04
Receptionist's time, filing cards for main location and cross-reference and author cards.	2	2.17 hr.	.04 $1.33

Reading review entry format

The format of the reading review entries is shown below:

Attributes:			Entity:	
Bibliog. Info.:				
Abstract and Comments:				

(large blank area)

I read:	Name:	Rating:	Filed Under:	
		Excellent Good	ME	CR
Location of Material:		Fair Poor	CR	CR
			CR	CR

Fig. 14.   Reading review entry
(main entry).

Explanation of format:

Entry number: Each reading review entry is assigned a unique number.

A workable number system is to list the last two digits of the year

the entry was filed (e.g., 69 for 1969) followed by a dash and an

accession number.   An example would be 60-304, meaning that this entry

was accessed into the system in the year 1969, and it was the 304th

entry that year.   The next year, accession numbers will start over

(e.g., 70-1, 70-2, . . .).

Attributes and entity: These tell at a glance what the material
contains. In a way they provide an "abstract of an abstract".

1. Attributes are qualities of the "thing" talked about in
   the source.

2. Entity is the "thing". It can be a population, an
   individual, or a program of action. Entity is "the
   existence of a thing as contrasted with its attributes"
   (Webster's Seventh New Collegiate Dictionary, 1965).

Attributes should be in noun form. For example, the attributes of the
entity "student" might be "IQ, aggression, withdrawal, physical
appearance." Think: attribute of an entity, IQ of a student, frame-
writing of programmed instruction, Air Force use of simulation,
administrative use of PERT, teacher education use of videotape, teacher
use of nonstandard dialect, disadvantaged children's use of nonstandard
dialect, positive reinforcement of rat training, etc. ("In" may
also be used in the same way, i.e., use of criteria in instructional
objectives). Attributes are separated from each other by commas
and from the entity by a semicolon (e.g., Afro-American, TESOD,
"rapping"; nonstandard dialect).

The words used for attributes and entities are limitless. They are to
be distinguished from the framework terms which are limited. The
purpose of giving attributes and entity is to tell in some detail what
the material contains. The purpose of stating main entry and cross
reference terms is to indicate where the material is to be addressed
within the term framework. The attributes and entity may contain the

very term used as a main entry filing location, but this is not necessarily

so. The material may be so specific that the attributes and entity

are much narrower in scope than the terms used in the framework. The

attributes and entity aid the indexer in determining addresses but do

not dictate addresses. For example, the material to be recorded contains

information on the topic of token economies. Specifically, it reports

an experiment in a mental institution with chronic schizophrenics,

involving automatic dispensers, fines for undesirable behavior,

bonuses for extra effort, and a variety of privileges and goods to be

purchased. The attributes and entity for this entry are:

> chronic schizophrenics, automatic dispensers, fines,
>
> privileges, purchases; token economy

The main entry, chosen from the term framework is:

> organizational systems, environmental designs,
>
> token cultures

The cross reference is:

> populations, mentally ill .
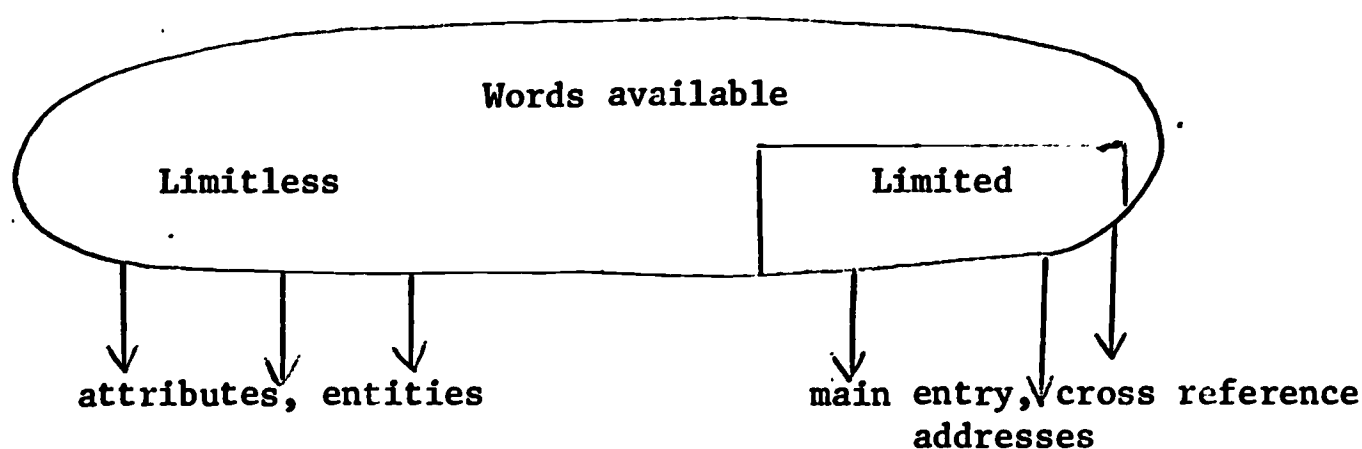
Fig. 15. The relationship of attributes,
entities, main entry and cross reference
addresses.

Bibliographic information: Standard bibliographic formats for the various types of printed material are consistently and carefully used.

Abstract: The length of an abstract should not exceed the space available on the card after the other information has been given.

Comments: A brief comment by the reader is optional.

I read: The reader indicates the nature of his reading of the material cited in the bibliographic information (e.g., scanned parts and read other parts carefully, read entire article, skimmed entire book).

Location of material: The place at which the actual piece of material can be found (e.g., personal library, Marvin Daley's library, University of Minnesota -- Walter Library [call number E105.6, T13]).

Reader's name: The person who read and abstracted the material.

Main entry and cross references: The reader chooses from the framework the terms under which his entry should be addressed. It is primarily the reader's responsibility to indicate these addresses, because he is

the one who has read the material and can best determine the main entry and cross reference terms. The indexer in charge of the Information Search and Recording System may need to change some of these addresses to insure consistency in filing within the system. However, the research staff should be familiar enough with the terms in the framework to enable them to determine the addresses (Figure 16).

Rating: The reader checks one of the ratings.
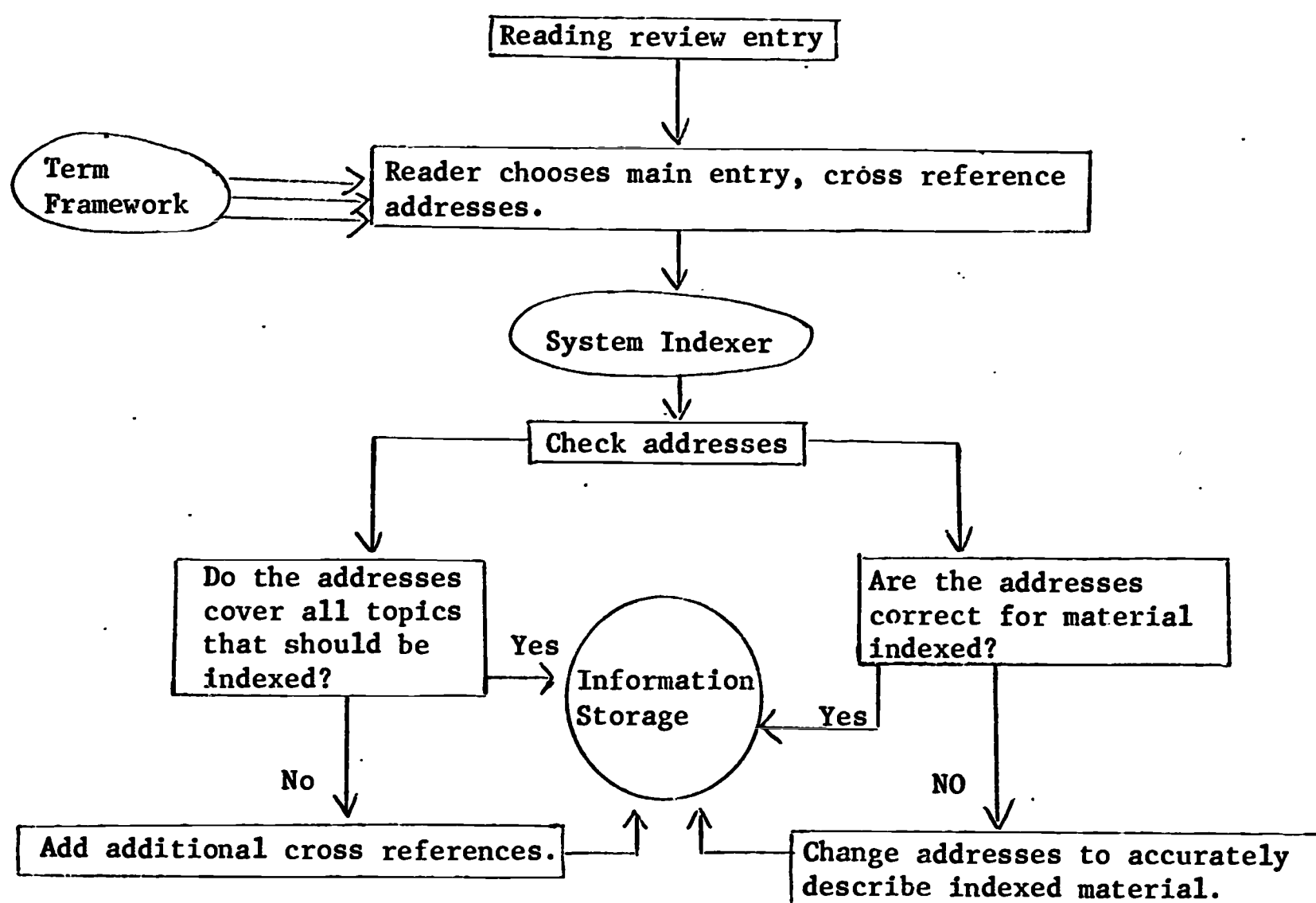
Fig. 16. Function of the system indexer,
reading review entries.

Operation of reading review entry system

Staff members program into their research activities time for professional reading and literature searching. They abstract and record information for future retrieval by themselves or other researchers. It is helpful to supply staff members with standard forms on which they can write or type their entries. The standard forms provide stimulus control over researchers which insures their inclusion of all the necessary information and use of standard bibliographic formats. Examples of a standard form and a completed reading review entry are shown in Appendix 1. It is highly desirable for staff members to have copies of reviewed journal articles, papers and short reports obtained at other libraries accessed into the Information Search and Recording System holdings. This is another inexpensive way of supplementing the information storage, and it makes the actual piece of material easily accessible to other researchers. The completed reading review entry form is given a unique number by the system indexer as explained above (e.g., 69-304), and its main entry and cross reference addresses are checked and changed if necessary. The entry is then typed and proofread. (See Flow Chart of Information Search and Recording System Operation -- Reading Review Entries, pp. 42-44).

Cross-referencing reading review entries

Since each reading review entry has a unique number, it is necessary to provide a more complete cross reference code than is used for other stored information. Furthermore, it would be an inefficient use of time if each reading review entry were retyped for every cross reference since much more information is contained than for regular library holdings.

A suitable code is shown below:

Code number of main entry term		Initial of author's last name		Reading review entry number
4.01	-	W	-	69-58
12.021301	-	C	-	69-304

When a researcher is perusing all the reading review entries within a term section, he finds cross reference cards which refer him to the main entry address (Figure 17).

File under: organizational systems, environmental designs, token economies

See: 1.04-W-69-67

Fig. 17. Cross reference address card, reading review entry.

The researcher locates the category and lower level term corresponding to the main entry code number, then goes directly to the initial of the author's last name and looks through all entries under that letter until he finds the reading review entry number indicated by the cross reference card (Figure 18).
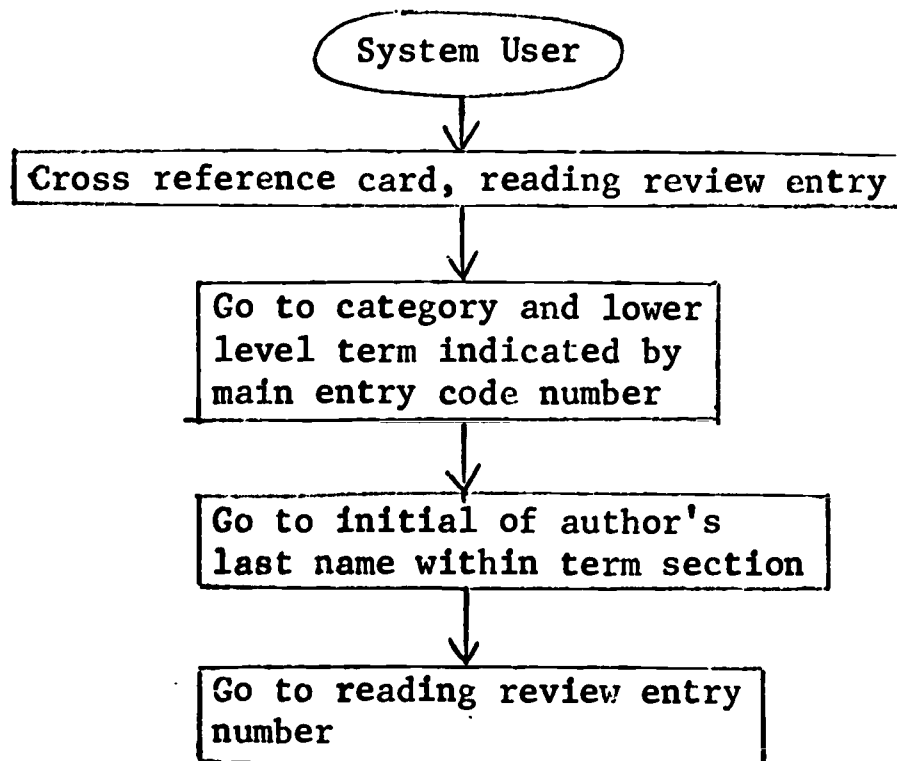
Fig. 18. Using the cross reference
address, reading review entry.

It is obvious that the finding of cross references would be very time-consuming if the reading review entries were numerous. The quantity of stored information would make an automated retrieval device feasible, as the author has substantiated in another paper (Fitch, 1969).

Xeroxing main entry lists

An excellent method of periodically informing staff members of recent additions to the reading review entry system is to xerox sheets of main entry cards for each staff member. These lists serve as reinforcement for staff members who have submitted entries, further communication among researchers regarding developmental activity, offer guidelines for personal reading of research material and inform staff members of current research material read by other researchers. Most staff members cut out the reading review entries that are of special interest to them for a permanent personal file. Without the use of xeroxed lists, many staff members would not be aware of the recent additions to the system, and a good opportunity for fulfilling all objectives of the Information Search and Recording System is missed.

Flow chart of Information Search and Recording System operation

The flow of activities involved in system operation of reading review entries is shown on the following pages.

Staff members program time for professional reading and recording of ISRS entries into weekly behavioral objectives.

Staff members read and record on ISRS forms - average about 8 entries a month.

Staff members turn in entries to Information Center

Tally is taken on entries turned in and number of times each staff member has used ISRS (xeroxed lists).

Entries are numbered. Filing location and cross-referencing are checked and changed if necessary.

To organizational management information system

To organizational management information system

INFORMATION SEARCH AND RECORDING SYSTEM OPERATION
Reading Review Entries

Entries are typed on 3 x 5 cards.

↓

Cards are proofread.

↓

Are there any errors on card?

- YES → **Return to typist for correction of errors.**
- NO

Is any further cross-referencing necessary?

- YES → **Add other cross reference locations to card.**
- NO

↓

Arrange cards by category.

```
┌──────────────────────┐           ┌──────────────────────┐           ┌──────────────────────┐
│ Xerox lists          │           │                      │           │ Typist files         │
│ of cards             │           │ Give  cards to       │           │ all cards in         │
│ arranged by          │  ────>    │ typist for           │  ────>    │ system under         │
│ category, collate    │           │ typing of cross      │           │ category, lower      │
│ lists, distribute    │           │ reference cards.     │           │ level terms.         │
│ to staff members.    │           │                      │           │                      │
└──────────────────────┘           └──────────────────────┘           └──────────────────────┘
```

IMPLEMENTATION

Training sessions

In order to train the research staff in the use of the Information Search
and Recording System and especially the reading review entry system,
it is helpful to conduct programmed training sessions. Samples of a
behaviorally-based 20-minute training session, materials and procedures
is given in Appendix 2. Training in the use of ERIC microfiche, indexes
and reader-printer may also be included at this time. An ERIC 10-minute
training session is given in Appendix 3. Before the sessions can be
held, it is necessary to obtain several reading review entries from
each staff member. A memorandum explaining the entry format, definition
of terms and the term framework is sent about two weeks before the
training sessions begin. A deadline for entries is set, and each staff
member signs up for a training session. Sessions are limited to five
people and should result in specifiable behavioral outcomes in the use
of the system.

After the entire staff has been trained when the system is first installed,
shorter individual training sessions may be held for members joining the
research staff later. Sample materials for these individuals sessions
are shown in Appendix 5.

CONTINUED OPERATION

The usual acquisition and processing procedures for stored information continues. A method of obtaining continual input to the reading review entries from all staff members should be considered. If a motivational system is required, it should lock into existing management practices. An example would be the programming of reading time into staff members' weekly behavioral objectives. A certain number of entries (e.g., eight entries a month per researcher) may be suggested, and staff members may be encouraged to spend their reading time at outside libraries.

Trial period for the reading review entry system

Since the time necessary to operate the reading review entry system is greater than for other stored information, a trial period should be established to determine the value of the system in terms of observable behavioral change among staff members. The trial period should be at least two months long. During this time, any means of measuring the system's effectiveness should be used. Some suggestions are:

1. Tallies of entries submitted by each staff member for a given period of time.

2. Tallies of staff members cutting out entries for personal files.

3. Tallies of staff members consulting the system to retrieve information from previous literature searches.

4. Questionnaire to staff on system's effectiveness.

5. Time required for each step of system operation.

6. One-to-one contact with system users to discuss system's strengths and weaknesses.

Flow chart of trial period

A flow of activities during a sample trial period is shown in Appendix 4.

Flow chart of Information Search and Recording System Development, Implementation and Continued Operation

A flow of activities involved in the entire development, implementation and continued operation stages of ISRS is shown on the following pages.

Plan, organize materials,
write outlines for, and hold
training sessions. Follow
guidelines in <u>Development</u>
<u>of an Information Search</u>
<u>and Recording System</u>.
(System Developer)

Ask: Do our information needs
warrant a Term Index?

No

Yes

Develop a Term Index. If
ERIC Thesaurus is used, key
this to System terms.

Make plans for continued operation,
according to particular needs and
management practices. Follow
guidelines in flow chart for
operation in <u>Development of an</u>
<u>Information Search and Recording</u>
<u>System</u>. (Program Director, System Developer).
(pages 42-44).

...explain System
...entries.

Give each staff member
the memorandum and
standard entry forms.

Entries are typed and numbered
(Secretary). Scan entries to
correct spelling and typing
errors. Determine suitability
of filing location indicated by
person making entry. Determine other
cross reference locations, if any.
Indicate filing and cross reference
locations on cards. (System
Developer)

Cross reference cards are
typed, lists of cards are
xeroxed and given to staff
members, cards are filed in
System drawers. (Secretary)

FOR DEVELOPMENT
SEARCH AND RECORDING SYSTEM

Review Entries

FLOW CHART F[...]
OF AN INFORMATION SEA[...]

Reading [...]

Write memorandum to staff. Request

Meet to discuss categories, lower level terms. Establish final term framework. Discuss adaptation of flow chart from Development of an Information Search and Recording System to particular needs. Discuss possible means of getting entries after initial input. Decide manner in which entries will be filed, location of System, who will type and file entries. (Program Director, System Developer)

Maintain contact with company if future information retrieval needs may warrant automatic system.

Follow flow chart set forth in Development of an Information Search and Recording System. Adapt to automatic System.

No

Yes

51

Read Development of an Information Search and Recording System. (Program Director, System Developer)

Derive System Objectives.

Contact company which specializes in automatic information retrieval systems. (System Developer)

Meet with company representatives. (Program Director, System Developer)

Ask: Do our information retrieval needs warrant an automatic system?

Yes

Investigate other companies' systems Choose a company. Work with them on development of system.

Ask: With this particular automatic system, can we adapt the software plan set forth in Development of an Information Search and Recording System?

No

Flow chart stops here.

TIME ESTIMATE FOR NON-AUTOMATIC SYSTEM (Using Development of an

Information Search and Recording System as a guide).

	Hours
Reading and studying Development of an Information Search and Recording System.	
Program Director	2
System Developer	8
Deriving objectives.	
System Developer	2
Contacting company which specializes in automatic information retrieval systems.	
Program Director (meeting with company representatives)	2
System Developer (meeting with company representatives, writing letter to establish contact, other arrangements)	3

Meeting to discuss and establish categories, lower level terms and adaptation of flow chart from Development of an Information Search and Recording System. Discuss possible means of getting continued input of reading review entries. Decide manner in which entries will be filed, location of system and person who will type and file entries.

Program Director	3
System Developer	3

Writing memorandum to explain system to staff, request entries -- follow guidelines in Development of an Information Search and Recording System.

System Developer	2

Typing memorandum, term framework, drawer tabs, xeroxing memorandum, standard forms.

Secretary	8

Typing entries from forms, numbering entries.

Secretary	@ 5 min. per entry

Scanning entries to correct spelling and typing errors, determine suitability of filing locations indicated by person making entry, change main entry and/or cross reference addresses, if necessary.

System Developer	@ 2 min. per entry

Typing cross reference cards, xeroxing lists of cards, collating and distributing lists, filing cards.

Secretary   @ 2 min. per
                                                                 entry

Planning, organizing materials, writing outlines for and holding training sessions—follow guidelines in <u>Development of an Information Search and Recording System.</u>

System Developer   1 for holding,
                                                             organizing each
                                                             session, more if
                                                             other training is
                                                             incorporated.

                                                             Planning time for
                                                             all sessions:5

All staff members   20 min. each,
                                                             more if other
                                                             training is in-
                                                             corporated.

Typing, xeroxing for training sessions.

Secretary   2

Keying Term Index to system terms, if this is to be done.

System Developer   8+ (for ERIC)
                                                             <u>Thesuaraus,</u> if
                                                             System Developer
                                                             knows categories
                                                             and lower level
                                                             terms by memory
                                                             so does not have
                                                             to refer to list
                                                             every time.

Continued operation activities:

Keeping tallies on use of system, time for typing,   Time
xeroxing, proofreading, etc., as explained in   depends
<u>Development of an Information Search and Recording</u>   on
<u>System.</u>   the
                                                             organization's
Writing memoranda concerning continued operation of   needs,
System.   and
                                                             management
Typing memoranda concerning continued operation of   practices.
system.

Meeting of System Developer and Program Director to
discuss continued input of entries by staff.

Continued operation as explained in <u>Development of an Information Search and Recording System</u> (i.e., flow of activities for system operation, changing lower level terms, installation of automatic equipment).

Continuous evaluation and revision.

CONCLUSION

The Information Search and Recording System explained in this paper

is an attempt to meet the information needs of developmental researchers.

It is a feasible system of classifying and recording information for

an organization with limited financial and human resources. The

reading review entry system enables researchers to abstract, record

and later retrieve information on subjects relevant to their efforts.

By reading the entries of other members of the staff, researchers are

guided in their personal reading and are able to keep abreast of current

research material read by other staff members. Xeroxed lists of entries

provide permanent personal files on topics of interest to individual

researchers. Reading review entries supplement information holdings by

addressing materials located in personal, public and college libraries.

The basis of ISRS, the term framework, is a precisely-worded subject

classification which develops use of a common vocabulary by staff

members. The categories, which are generated from and lend support

to the developmental program, are fairly rigid, but great flexibility

is possible at the lower levels. This allows for some change of

developmental activities and related information needs within the

program.

The system developers proceeded on the assumption that automated equip-

ment might become available to the research organization and used

procedures and a subject classification scheme compatible with automatic

systems. If a research organization uses these procedures for development

and implementation of a non-automatic Information Search and Recording

System, all that is required to transfer to certain automated systems

(e.g., Access Corporation's System 60) is the retyping of entries on specially prepared cards. A method of retrieving cross references for the reading review entries other than typing one cross reference per card should be devised to avoid overloading the automatic system.

Each research and development organization whose information needs are met by the system explained in this paper must adapt the system to its particular requirements, information storage and management practices. However, this paper should provide specific guidelines for all steps in the development, implementation and continued operation phases. The authors will welcome questions from organizations seeking a system similar to this one for their specific information retrieval needs.

REFERENCES

American Psychological Association. Publication Manual.
        (Rev. ed.) Washington, D. C.: Author, 1967.

Bibliographic entries used as examples in this paper follow
the format given in this manual.

Ammentorp, W. A. An information search and recording system.
        Unpublished manuscript, Upper Midwest Regional Educational
        Laboratory, Minneapolis, 1968.

This paper, which offers a rationale and framework for an information
system, was the base from which the present system developed.

Educational Resources Information Center (ERIC). ERIC Thesaurus.
        (2nd ed.) Catalog No. FS 5.212: 12031-69, April 1969,
        Contract Nonr OE-12031-69, Office of Education.

This publication may be adapted to provide a term index or thesaurus
for the Information Search and Recording System by keying terms in
the book to the system's terms.

Fitch, J. P. Rationale for an automatic information retrieval
        system. Unpublished manuscript, Upper Midwest Regional
        Educational Laboratory, Minneapolis, 1969.

Hill, R. A. Survey strategy. Draft: November 27, 1968.
        Modified December 19, 1968, Research for Better Schools,
        Philadelphia, 1968.

A preliminary paper which system developers consulted in the
beginning stages.

Journal of the Experimental Analysis of Behavior.

The format for system reading review entries was adapted from
the format of the cards in the back of each journal issue (i.e.,
attributes and entity are listed in a fashion similar to the
terms at the top of each journal card).

Knoblauch, S. Memorandum to the staff on the information
        search and recording system. Unpublished manuscript,
        Upper Midwest Regional Educational Laboratory, Minneapolis,
        December 19, 1968.

A preliminary paper written in the early stages of system
development.

Webster's seventh new collegiate dictionary. Springfield,
Mass.: G. & C. Merriam Co., 1965.

Definitions cf "attribute" and "entity" were taken from this
dictionary.

Attributes:

APPENDIX I

(Terms or phrases which describe topic)

	Entry: 59
Bibliographic information:	(Topic of book or article)

(Author[s] or editor[s])

(Title of book or article)

(Place of publication, if book, or journal title)

(Publisher, if book, or year, volume, number, pages of journal)

Abstract:

Comments:

Suggested related articles (optional):

I read: All of material Other _____	My name:	Rating: Excellent ___ Good ___ Fair ___ Poor ___	ISRS addresses: Main entry _____ Cross reference _____ Cross reference _____ Cross reference (Use ISRS term framework)
Location of material:			

graphic language, basic LOGOS elements

Silvern, L. C. LOGOS: A system language for flow chart modeling. Educational Technology, 1969, June, 18-23.

LOGOS is a graphic language used to communicate effectively with readers who prefer words and those who insist on the unambiguous terminology of mathematics. Elementary applications of LOGOS rely on alpha characters forming groups of words or narratives which are combined with LOGOS symbols culminating in a flow chart. LOGOS is a language used in model building. The thought expressed by a LOGOS flow chart is a conceptualization in the form of a graphic analog representing a real life situation. Basic LOGOS elements--function, signal pass, feedback signal pass, feed forward signal pass, special symbology, sequencing and coding--are explained in detail.

Comments: An excellent guide in preparing sophisticated flow charts.

Location: UMREL	Reader: J. Fitch	Rating: Excellent☐ Good☐	ME M-sys CR
Read: Entire article		Fair☐ Poor☐	CR CR

operations research, PERT, PPBS, information systems, system synthesis

Cook, D. L. The impact of systems analysis on education. Paper presented at the seminar on Systems Analysis, Temple University, Philadelphia, Pa.,April 18, 1968.

System: Series of interrelated and interdependent parts designed to accomplish a goal or objective. Gives general characteristics of systems philosophy. Application of the systems philosophy in education has been primarily concerned with variables which are readily classifiable. For those who are concerned over the representation of systems by mathematical formulas, an equally valuable way of representing systems is through some type of descriptive flow graph procedure. Specific applications in education include instructional systems, project management systems (PERT and CPM); management information systems (for better decision making); PPBS (includes cost/benefit analysis; PPBS is sometimes confused with program budgeting, which generally refers to a financial accounting system which assigns costs to objectives rather than to traditional categories); and operations research. More time will have to be spent on management, management systems, information management systems, and related topics if educational administrator is to better understand wide variety of systems applications being made.

T-inf
M-PPBS

Location: UMREL	Reader: J. Fitch	Rating: Excellent☐ Good☐	ME M-sys CR M-de
Read: Entire paper		Fair☐ Poor☐	CR M-ope CR M-PE

APPENDIX 2

Training session in use of ISRS

Each staff member receives a packet of materials at the beginning of the training session which includes:

1. Agenda for the training session including behavioral outcome. (See sample on p. 64).

2. Term framework.

3. Xeroxed list of first set of entries to system.

4. Slips of paper requesting information to be located in system. (See samples on next page).

Behavioral outcome

After attending a training session in the use of the Information Search and Recording System, each trainee will be able to demonstrate this behavioral outcome:

Given a term framework, a slip of paper with information to be found and a pencil, each trainee will be able to locate in the drawer the information requested on the slip of paper and write the address of the information using the code form:

4.602-W-69-58

Sample slips requesting information to be located in ISRS

1   Find the card with information on atomism in Chippewa Indians.

2   Find the card with information on classroom control by Thomas et.al.

3   Find the card with information on criterion score variance.

4   Find a card with information on program budgeting.

5   Find a card with information on evaluative techniques in core
     curriculum.

Procedure

System trainer:

1. Presents the agenda.

2. Explains behavioral outcome, information request slips, and Term Index (if used).

3. Checks answers of each trainee.

4. Offers guidance where necessary.

The trainer lists the answers to each slip from the appropriate category and term section before each session begins so that he can quickly check trainee answers.

Sample agenda for ISRS and ERIC training sessions

I. Explanation of ISRS

A. Brief explanation of system objectives, holdings, and
    procedures.

B. Confusing aspects:

    1. Immediately after reading material you want a record
        of for yourself or you know would be of interest to
        other lab members, fill out a reading review entry
        form. It is permissible to use journal abstracts
        but add any pertinent information and comments. To
        save time, abstracts which you write yourself can
        be dictated and typed in rough draft form. After
        you have made any changes in the rough draft, give
        it to the ISRS secretary for typing on standard
        cards.

    2. Use code numbers for category and lower level terms
        when indicating filing locations on the form.

    3. Cross reference cards for reading review entries use
        a special code:

Main entry code number		Initial of author's last name		Card Number
4.201	–	W	–	69-58
3.01	–	C	–	69-5

    4. If you don't know where to look for information on a
        topic within the term framework, use the Term Index:

        Look up the topic you have in mind in the Term Index
        (coded ERIC Thesaurus). The ISRS category under which
        this topic will be found is listed in the Term Index.
        Locate the category in the system card drawers and you
        should find information on the topic.

C. Behavioral outcomes of ISRS training session:

    Given appropriate page of Term Index, system drawer corresponding to
    to page of Term Index, slip of paper with information to be found
    and pencil, each trainee will be able to locate in the drawer
    the information requested on the slip of paper and write the
    location of the information using the code form.

II. Explanation of ERIC

A. Brief explanation of use of ERIC microfiche files, indexes, and reader-printer.

B. Demonstrate use of each.

C. Behavioral outcome of ERIC training session:

Given an ERIC index and resume book, slip of paper with information to be found and pencil, each trainee will be able to locate ERIC numbers (no more than two numbers for information requested) and write index page number and resume page number on slip of paper.

Given his ERIC number and the ERIC files and Reader, each trainee will be able to pull the film from the drawer and operate the reader-printer in order to obtain a print-out of the abstract, which he will give to the trainer.

APPENDIX 3

<u>Training Session in use of ERIC</u>

Each staff member receives a packet of materials at the beginning of the training session which includes:

1. Agenda for the training session including behavioral outcomes. (See sample agenda on page 64).

2. Slips of paper requesting information to be located in ERIC indexes and microfiche cabinets and for which the print-out of the abstract will be obtained. (See samples on following page).

<u>Behavioral outcomes</u>

After attending a training session in the use of the ERIC microfiche, indexes and reader-printer, each trainee will be able to demonstrate these behavioral outcomes:

Given an ERIC index and resume book, slip of paper with information to be found and pencil, each trainee will be able to locate ERIC numbers for information (no more than two numbers for information requested) and write index page number and resume page number on slip of paper.

Given an ERIC number and the ERIC files and reader-printer, each trainee will be able to pull the proper microfiche from the drawer and operate the reader-printer in order to obtain a print out of the abstract which he will give to the trainer.

Sample slips requesting information to be located in ERIC

I-5   Find 2 sources on the use of systems--one having to do
           with education of underachievers, one having to do with
           open door colleges.

           Number_____ Resume on page_____, _____, _____.
                                                      Month   Year

           Number_____ Resume on page_____, _____, _____.
                                                      Month   Year
           Available from EDRS_____

II-4   Find 2 sources on the use of linguistics--one having to
           do with the preparation of teachers, one having to do with
           the linguistic variable as a structural unit.

           Number_____ Resume on page_____, _____, _____.
                                                      Month   Year

           Number_____ Resume on page_____, _____, _____.
                                                      Month   Year
           Available from EDRS_____

III-1   Find 2 sources on reinforcement.

           Number_____ Resume on page_____, _____, _____.
                                                      Month   Year

           Number_____ Resume on page_____, _____, _____.
                                                      Month   Year
           Available from EDRS_____

IV-2   Find 2 sources on classrooms--one having to do with classroom
           environments, one having to do with classroom techniques.

           Number_____ Resume on page_____, _____, _____.
                                                      Month   Year

           Number_____ Resume on page_____, _____, _____.
                                                      Month   Year
           Available from EDRS_____

V-3   Find 2 sources on elementary school students, one having to do
           with the effects of competition and anxiety, one having to do
           with self-direction.

           Number_____ Resume on page_____, _____, _____.
                                                       Month   Year

           Number_____ Resume on page_____, _____, _____.

           Available from EDRS_____

Procedure

System trainer:

1. Presents the agenda.

2. Explains behavioral outcomes, information request slips, ERIC indexes, microfiche cabinet and use of reader-printer. (Demonstration).

3. Checks answers of each trainee.

4. Checks print-out of abstract for proper ERIC number.

5. Offers guidance when necessary.

The trainer lists the answers to each slip from the appropriate index before the session begins so that he can quickly check trainee answers. The system trainer gives each trainee the ERIC index in which the information to be located appears. Each index may be coded with a number (e.g., V-3, II-4) which matches the slip number so the system trainer can quickly determine which index contains the specific piece of information.

INFORMATION SEARCH AND RECORDING SYSTEM (ISRS)
FLOW CHART FOR TRIAL PERIOD
APRIL 1 - MAY 31, 1969

Reading review entries

Collect dat...
tem is use...
members

Collect da...
typing syste...
on 100 samp...
per card.

Collect dat...
reading att...
abstracts c...
card, check...
obtaining X...
xeroxed art...
samples. Es...
per entry.

Collect dat...
type cross
organize
bredl),xero
weekly
file cards
system.
Estimate:

Staff membe
minimum of
Report to

Collect, or
mation, for
Document 1:
set up ISRS
April 4 -
data later.
Document 2:
recommend I

April 4 -

Time estimate for
ISRS, made April 1 -
May 31, TRIAL PERIOD,
memo sent to Hill asking
for secretarial help.
Flow chart drawn.

Memo sent to
staff explaining
system usage
tallies. Criterion
of more experimental
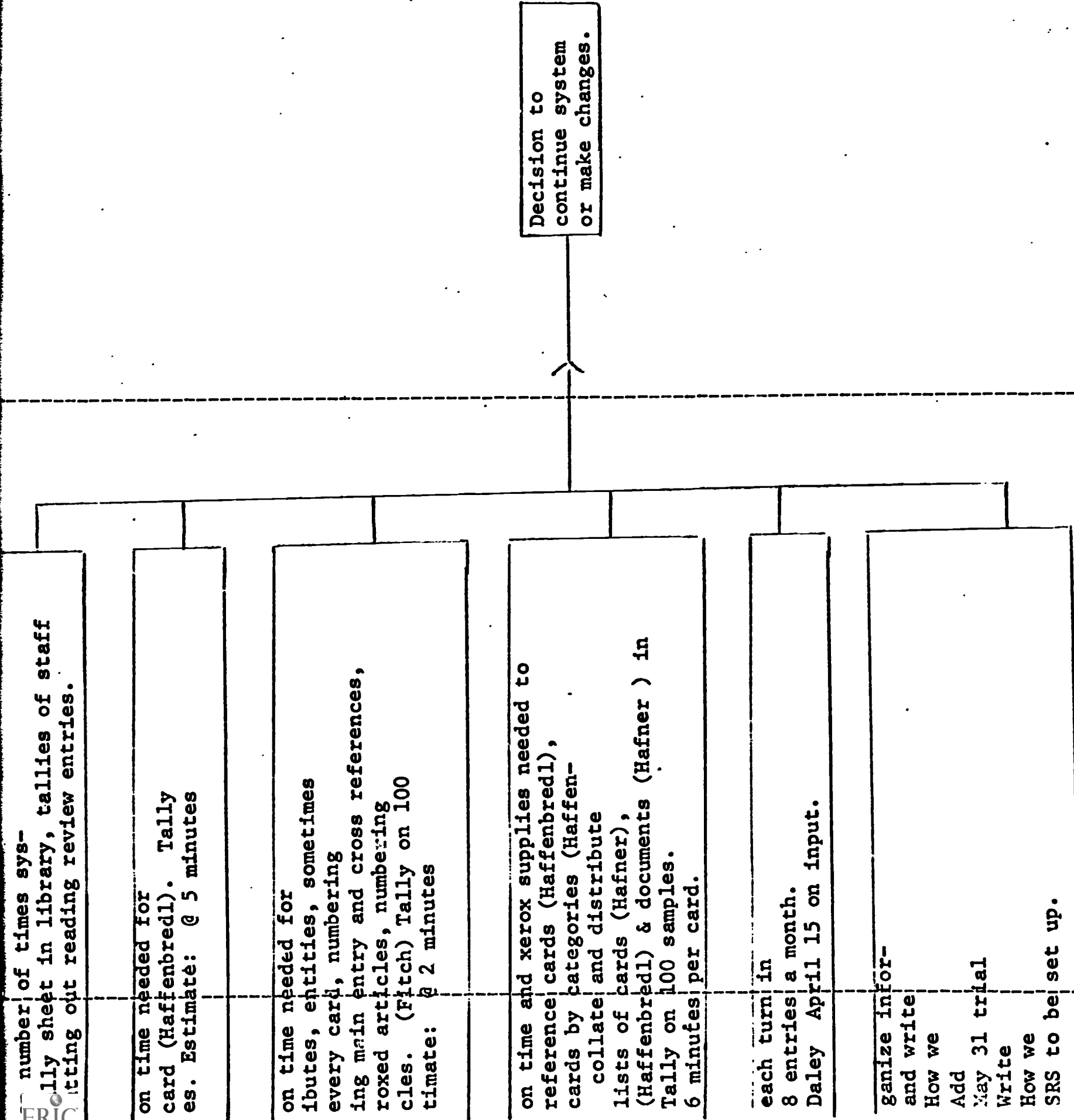types of material
emphasized for
System entries.

Meeting to set up
management of
continued input
to ISRS (Ammentorp,
Daley, Fitch)

April 4, 1969

April 1, 1969

Decision to continue system or make changes.

number of times sys-
lly sheet in library, tallies of staff
tting out reading review entries.

on time needed for
card (Haffenbredl). Tally
es. Estimate: @ 5 minutes

on time needed for
ibutes, entities, sometimes
every card, numbering
ing main entry and cross references,
roxed articles, numbering
cles. (Fitch) Tally on 100
timate: @ 2 minutes

on time and xerox supplies needed to
reference cards (Haffenbredl),
cards by categories (Haffen-
collate and distribute
lists of cards (Hafner),
(Haffenbredl) & documents (Hafner) in
Tally on 100 samples.
6 minutes per card.

each turn in
8 entries a month.
Daley April 15 on input.

ganize infor-
and write
How we
Add
May 31 trial
Write
How we
SRS to be set up.

April 30   May 1 - May 31, 1969

June 2, 1969

Locate in the library:

        Staats, A. W. et. al. "Motivated learning" reading treatment with
        subprofessional therapy-technicians.

Bring this material to the librarian.

Locate in ISRS reading review entries:

        Information on behavioral objectives. (one entry only)

Bring to the librarian.

Locate in ERIC:

        ED 29493

Bring a print-out of the abstract to the librarian.

Locate in the library:

        Homme, L. A behavioral technology exists here and now.

Bring this material to the librarian.

Locate in ISRS reading review entries:

        Information on System Analysis. (one entry only)

Bring to the librarian.

Locate in ERIC:

        ED 29486

Bring a print-out of the abstract to the librarian.

METHOD OF REFILING MAIN ENTRIES AND CROSS REFERENCES WHEN A TERM IS ADDED OR
DELETED FROM THE ISRS TERM FRAMEWORK   (Reading review entries)

Additions:

1. All entries that will be filed under the new term are in the term directly
    one level above; for instance, if the new term is on Level 3, all entries which
    will be refiled under the new term are under the Level 2 term immediately above.

2. Go through all main entries under the Level 2 term and determine which of these
    should be refiled under the new term on Level 3.

3. Go through the cross reference cards under the Level 2 term and locate the main
    entries for these cross references.

4. Determine which of the main entries indicated on the cross reference card
    should be cross referenced under the new Level 3 term.

5. Make new cross reference cards for those main entries which are to be cross
    referenced under the new term.

6. Destroy old cross reference card.

7. For each main entry that has been refiled, replace the main entry with a card
    which says:

        Main entry(entry number) has been refiled under(new main entry address).

    This will enable system users to locate the main entry indicated as a
    cross reference throughout the system, even after it has been refiled in
    a new location.

Deletions:

1. All entries filed under a term which is deleted will be refiled in the term
    directly one level above. For instance, if entries were filed under a Level
    3 term which has been deleted, all entries will be refiled under the Level
    2 term directly above.

2. In order that cross references to the main entries which were filed under the
    deleted term may be located, a card is inserted behind the index for the old
    term. The card says:

        All entries filed under (deleted term) have been refiled under (new address)